Materials for Learning

How to Teach Adults at a Distance

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Introduction

> Adult education has to be directed at helping men to develop themselves. It has to contribute to an enlargement of Man's ability in every way. In particular it has to help men to decide for themselves - in cooperation - what development is. It must help men to think clearly; it must enable them to examine the possible alternative courses of action; to make a choice between those alternatives in keeping with their own purposes; and it must equip them with the ability to translate their decisions into reality. (1)

This task demands resources beyond those available in ordinary schools and colleges. Distance teaching, with its capacity to stretch resources, can help. Effective distance teaching requires effective teaching materials. We lack guidance both on how to produce such materials and how to do so for different cultures. This book aims to fill that gap. Wherever possible, it suggests guidelines for action. Where evidence is mixed or lacking, it defines those questions that still require answers. It is a practical book, meant for people actively engaged in nonformal education.

The book has been compiled from reports of experience in the field, and from a survey of research. It contains an extensive bibliography.

Distance teaching

The educational problem - Distance education - Correspondence education - Radio study groups - Radio schools - Television - Extension services - Newspapers - Culture and education - Summary

We arrived in the village near Kaolack, Senegal, at nine o'clock in the evening. The villagers were already assembled, sitting in a semi-circle with the radio set and two oil lamps in the centre. It was dark and only gradually could we make out the black figures in their white robes who looked at us intently as they watched us on their 'village sand' with the straw or mud houses in the background.... As we arrived, the audience was already intensely attentive, yet not to an educational programme but to a popular serial. There followed the half-hour presentation of the 'radio éducative' (devoted this evening to a highly technical exposition on how to sift and prepare groundnuts for the market). The programme over, the radio was switched off and the 'animateur' called on the villagers to make their comments, while the secretary took careful notes next to one of the oil lamps....

My own principal interest was to learn about the significance of group listening. In answer to my question, I was told that there were some 30-40 radio sets privately owned in this village. 'Why, then, do you come here three times a week to listen together?' A middle-aged man in the front row answered promptly under the nodding approval of the others: 'When I listen at home I only listen with half an ear. Here in the group we do nothing else but listen, and so I understand better what is said. Moreover, we have an opportunity to discuss what we have heard, something I could not do at home. And finally, we make immediate decisions when this seems called for.' The words were spoken in Wolof, but I had heard the same views expressed in Marathi in India. 'Listen, Discuss, Act,' the slogan first coined by the Canadian Farm Forum, came to life in the African night.

This account was written by Henry Cassirer in 1971. (1) The radio clubs he describes had started in 1968, in 57 villages in one region of Senegal. They spread to other regions and flourished until

recently. The villagers of Kaolack are distance learners. Their 'teachers' are the people who address them over the radio. The villagers cannot talk to their teachers, but they can communicate with them by letter. Sometimes a radio team will visit the village and record a discussion; more than half of each programme is recorded outside the studio. Thus the learners have a kind of dialogue with their 'teachers' and with their fellow students in other villages. They can also get questions answered by government officials, who frequently take part in programmes. The aim is to assist people who could never meet to exchange points of view; the radio programme is called 'Dissoo', a word meaning 'dialogue' in the local language, Wolof.

Why are these people studying at a distance? Would it not be preferable to concentrate resources on building more schools for children?

THE EDUCATIONAL PROBLEM

The chances of offering such villagers the education they need by traditional methods are very slim. There are two problems. First, there are not as many primary school places as there are children, and there are even fewer secondary ones. (2) Second, many of those who complete primary or even secondary education are no longer assured of a job. Many curricula were designed with an academic bias which prepared children for a job in the civil service or elsewhere in the modern sector. That bias is inappropriate for many. On the one hand, the skills are of little use to rural people, while on the other the economy cannot expand fast enough to create jobs in the modern sector for all the newly schooled. (3)

So at present not everyone is getting even a basic education. As for the past, the fact that 800 million adults throughout the world are unable to read tells us enough. (4) What of the future? The poorer countries are trying to ensure that all their children have access to primary school. But each year, more children are waiting to crowd in through the school gates. And children need teachers, who have to be trained. For many countries of the world, it will be impossible to provide even primary schooling for all their children by the end of the century - at least by conventional methods. (5) In some countries distance teaching is now being used either to train teachers or to teach children. (6)

But that is another story. Here we are concerned with adults, the backlog of educational failure. Vast numbers of adults have had no education at all, or have had an education of little relevance to their everyday life. Meanwhile, the bulk of educational resources is consumed by schools and little is left for adults.

We would not wish to deprive the schools. But adults out of school also have educational demands. Out-of-school education is often called 'nonformal' education, in contrast to formal education which takes place in school, college or university. Our main concern here is with nonformal education for people who have had little or no schooling. One of the greatest constraints on adult education is the shortage of teachers. Distance teaching provides an alternative.

DISTANCE EDUCATION

Distance teaching has been defined as 'an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner'. (7)

The great strength of distance teaching is that it provides a means of teaching people wherever they are. One radio programme, or many copies of the same booklet, can serve large numbers. In this way the work of a few teachers can be shared amongst far more people than could ever attend their classes, and costs can be reduced.

Even when a class has a teacher, distance teaching can help improve the quality of education. If a teacher is inexperienced or unfamiliar with certain subjects, students can learn from a distance while the teacher guides rather than teaches them.

Figure 1.1 describes how distance teaching and conventional teaching overlap. It shows that the two often work together. The circle on the left represents distance teaching, and that on the right conventional education. The shaded part represents the overlap between the two forms of teaching, the area where they complement each other and work together.

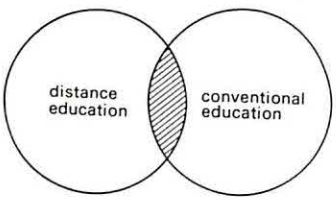


FIGURE 1.1 The relationship between distance education and conventional education

Some face-to-face learning is an important component in distance teaching. Research in human communication and learning has underlined the importance of personal interaction. Distance educators sometimes therefore talk about three-way teaching as the most effective technique - a combination of print, broadcast and face-to-face learning. (8)

To return to the villagers of Kaolack and others like them: how can distance teaching be used as an alternative way of teaching? The description of their radio club showed us one way but not the only one.

CORRESPONDENCE EDUCATION

The first form of distance teaching to be developed was the correspondence course. (9) In 1840, with the advent of the penny post in the United Kingdom, Isaac Pitman started teaching bookkeeping by correspondence to one of his students who had moved away. The idea was taken up elsewhere and ever since correspondence courses have been used for a variety of subjects.

Some correspondence education keeps to the original pattern of

lecture notes and postal tuition. But in many cases a concern for quality has led to innovation: the replacement of lecture notes by texts designed for individual home study; the organisation of occasional group meetings of students; and the use of radio or television broadcasts to supplement and reinforce the printed materials.

One development which is of particular relevance to our main theme, the education of people with little or no formal schooling, is the use of correspondence courses by groups of illiterate African farmers. It sounds impossible, as correspondence courses apparently require literacy. But if one member of a learning group is able to read, it can be done. Since 1962 the Institut Africain pour le Développement Economique et Sociale (INADES) has been running such a course. (10) INADES is based in the Ivory Coast, but the course, 'Agri-Service Afrique', is used by groups of farmers in most countries in francophone Africa. Where possible the study group is based on an existing social unit. A local 'animateur', a paid INADES fieldworker, or a local priest working informally for INADES, encourages the formation of groups. Each group must pay a small sum to follow the course, but this is generally found by selling the produce from an experimental plot used to try out the techniques taught. The group must have as its leader a literate French-speaking member. Even though the course books are written in very simple French, with a basic vocabulary of only 600 words, the most difficult problem is to find an appropriate leader. Once such a person has been found, he will read out the lessons to the group and guide the discussion.

Groups meet as they wish, once or twice a week, and generally take six weeks to work through each booklet. When everything has been thoroughly discussed, the group agree on their answers to questions printed in the text and on any additional questions of their own. The leader writes these down and sends the answers and queries to INADES for comment.

The leader is not left to work alone. The 'animateur' will meet him regularly and work through the booklet with him to make sure he understands it. The leader will often have to translate it into his local language; INADES has found that it is often easier and more effective for the leader to do this himself than for translations to be prepared centrally. The 'animateur' also visits the groups about twice a month to discuss their work. INADES has discovered that the role of 'animateur' is vital; groups work more effectively and faster if they are frequently visited by him.

Of course not all groups succeed. Many farmers withdraw from them and some groups dissolve. A study in Mali over four years found that only 30 per cent carried on through the course. But of those who completed the course, half were illiterate. (11) INADES has had some success in breaking the literacy barrier.

RADIO STUDY GROUPS

The idea of radio study groups followed quickly after the start of public broadcasting. Study groups began in Britain in the 1920s and continued until the end of the 1930s, encouraged and supported

by the BBC. (12) Meanwhile other European countries and the USA took up the idea. (13) The most important development for the future of this method came in 1941, when a national programme of Farm Radio Forums started in Canada. (14) Meant for the whole of the farming population, the forums dealt with the 'real social and economic (problems) of rural Canada'. (15) In the winter months groups of farming families would meet together, listen to a radio programme, discuss it with the help of a brief printed guide, and write down and send in their conclusions on three discussion questions. Their letters were answered and were also used as a guide for planning future programmes. After the discussion the meeting would become a social gathering, much valued in the long northern winters.

In the 1950s, as farmers became more prosperous, forums became less popular, and the series ended in 1965. But meanwhile forums started elsewhere - in India, for example, in 1956 and in Ghana in 1964. (16) In Senegal, as we saw earlier, and other former French colonies in West Africa, radio clubs have taken a slightly different form, with village groups participating to a greater degree in the content of the programmes. (17)

In Africa the numbers of clubs or forums served by any particular radio programme have remained relatively small; however one development on a larger scale has been that of the radio study campaign, pioneered in Tanzania and more recently tried in Botswana. (18) A series of radio programmes on a particular topic - health and nutrition for example in Tanzania, or the government's new Tribal Grazing Land Policy in Botswana - is broadcast to specially formed groups provided with a radio and a printed study guide. This method reaches very large numbers - an estimated 2 million in Tanzania in 1973, out of a total population of 15 million - but it does have drawbacks. It demands lengthy preparation and a large and sophisticated organisation to distribute materials and train group leaders. The scale makes it difficult to be sensitive to regional variations while there are severe limits to the educational content of a necessarily short campaign. Radio campaigns depend on the existence of a well-developed infrastructure of local workers, such as schoolteachers or extension workers, who include work for the campaign within their normal jobs.

RADIO SCHOOLS

In Latin America the potential of radio for education was taken up in a rather different way. In 1947 a Colombian priest, Father Salcedo, saw that radio could bring basic education to isolated peasants. He started a radio school, using a combination of radio programmes, printed materials and local volunteer monitors to bring literacy and primary-level schooling to small groups of rural people. Seen at first as a cranky experiment, Acción Cultural Popular (ACPO) grew rapidly and today has over 40,000 students. (19) Since then many other radio schools have been started in Latin America and the Caribbean, mostly by church-funded groups. (20)

Many of these schools teach literacy and the primary curriculum, but they are also searching for ways of moving beyond the formal

curriculum so as to create understanding that will help peasants towards greater control of their lives. Acción Cultural Popular Hondureña, a Honduran radio school, has devised a curriculum which links literacy and numeracy with agricultural production, matching the lessons to the agricultural cycle. (21) Unlike the radio campaigns, the schools offer a curriculum which allows students to progress from one year or one agricultural season to the next, gradually increasing their mastery of skills relevant to their everyday lives.

TELEVISION

In the 1960s television was enthusiastically adopted by educators. It was introduced in several developing countries as a way of extending access to formal schools and improving the quality of teaching. (22) Some experiments also took place in the use of television for nonformal adult education; there was an experiment in Dakar, Senegal, with 'téléclubs' from 1965 to 1968, (23) for example, and more recently the Satellite Instructional Television Experiment took place in India from 1975 to 1976. (24) Such experiments continue, but early experience was largely disappointing and after the initial enthusiasm for television, radio is again becoming more popular. Radio is cheaper and easier to use, and can, generally, teach as effectively as television. In third-world countries, there is, too, a much bigger audience for radio than for television.

EXTENSION SERVICES

Much adult education is offered not through radio or television but face-to-face, by extension agents. Agricultural demonstrators, community development officers, district health workers and other rural agents have a dual role, of supplying goods or services and of training. Their work is central to much rural development. But all too often it is ineffectual. (25) Extension workers are too thin on the ground and often do not come into contact with those most in need of support; communication between central and regional government offices and local level workers is difficult, so that agents in the field often have inadequate information, facilities and in-service training.

In Malawi the Extension Aids Department of the Ministry of Agriculture has been trying to co-ordinate information services for several years. (26) The department produces a monthly farmers' magazine, where articles cover the same topics as radio programmes during the period. It also produces texts for extension workers, with accompanying pamphlets for farmers, and films which are shown by mobile units.

This ministry of agriculture produces its own materials. An alternative approach is to have a specialist distance-teaching unit working as a service agency. The Lesotho Distance Teaching Centre operates in this way. (27) In some cases the centre has simply printed material, but often it has worked jointly with other organi-

sations, such as the Lesotho Family Planning Association (LFPA): (28)

> Our work with LFPA field educators involved designing a standard talk to give at village *pitsos*, a flip chart of pictures to accompany the talk and a pamphlet to hand out after the talk. We held two training courses to help field educators give the talk and use the visual aids effectively. Comments by the field educators during these courses were taken into account in the final design of the materials. We also produced two correspondence lessons for field educators on topics they suggested. To make the general public more aware of family planning we designed a series of 15 radio 'spots' and 6 programmes, which were broadcast during August 1976. We produced pamphlets on different contraceptive methods which were distributed during November and December. We also conducted a large scale survey of attitudes to family planning in Lesotho with a view to planning the second phase of the project.

NEWSPAPERS

Newspapers and magazines can be used for education. 'Famille et Développement' ('Family and Development') is a monthly journal started in Senegal in 1975. It was originally designed as a bulletin on family life education and immediately appealed to a wide audience. It now has a circulation of around 40,000 copies in twelve francophone African countries, and articles range from economics to recipes. (29) Its success underlines two major points: in many developing countries there is a grave shortage of reading matter relevant to the lives of ordinary people; and, where such reading matter is available, it is enthusiastically sought after.

ACPO produces an educational weekly, 'El Campesino' ('The Peasant'). The sixteen-page paper is written in simple Spanish, and provides new readers with a regular source of reading matter. Some 70,000 copies are printed each week, and it is thought that each copy is read by an average of nine people. (30)

Sometimes regular newspapers have educational sections. One of the Tanzanian daily papers carries a page for new readers written in simple Swahili. A rather larger scale enterprise was mounted by SACHED (the South African Committee for Higher Education), a non-governmental group providing education for black South Africans. 'People's College' was a twenty-four page supplement to the popular South African Sunday paper, 'Weekend World'. 'People's College' came to an abrupt close after about six months when the government banned the newspaper and arrested the editor in Autumn 1977. In its short life the supplement had provided courses from easy reading to pre-university level, on both practical and academic subjects.

Letters to the editor can be used to create a sense of dialogue. In 'People's College' a topic was suggested each week for people to write about, in order to encourage participation and some two-way communication. Similarly, 'Kibaru' from Mali has tried to create a vehicle for communication between its rural readers by gathering together contributions from a number of local communities. (31)

CULTURE AND EDUCATION

Distance teaching takes various forms but, in any case, demands good teaching materials tailored to the needs of the student. The same subject matter will have to be presented in different ways for beginners or advanced students, for children or adults. A lesson on the classification of foods, for example, would be different for a mother, a school child, or a nurse. But these differences between people, of age or occupation, are not the only ones we have to take into account. Differences between the societies in which our students live are at least as important. To design effective materials we need, therefore, also to consider culture - the forms of social or political organisation, religious traditions, the structure of work and of family life, which govern people's everyday life. The materials must be in harmony with the culture.

To make education effective, then, we need first to understand the culture of the learners. With that understanding, it is possible to design materials which start from what is familiar within a particular culture, before moving on to the unfamiliar. If, for example, we are teaching nutrition we need to start from a knowledge of existing diets, and traditions which may render some foods unacceptable, before moving on to new ideas.

There is, of course, more to culture than the surface features of ceremony, or of dress, or of habits of greeting or eating, which immediately strike the outsider. Human behaviour reveals underlying values. And learning needs to relate to those values. In each culture people are likely to have different priorities for the knowledge or skills they choose to acquire, and different ways of organising and using that knowledge. Those priorities, and the values of each culture, will determine how we teach.

SUMMARY

This chapter started with a general review of nonformal education. We then looked at distance teaching, seeing it as one technique used for the nonformal education of adults - and a technique that is growing in importance as its versatility becomes more evident.

We saw that if materials are to be effective, they must be planned and prepared to fit the requirements of specific audiences and cultures. Later chapters will consider in detail planning, working through various media, and presenting various topics. But first there are some questions of communication and learning which are examined in the next three chapters.

BACKGROUND READING

For general reading on education, particularly nonformal education and development, any of the following are helpful: Edgar Faure et al., 'Learning to Be'; Philip Coombs with Manzoor Ahmed, 'Attacking Rural Poverty'; Richard O. Niehoff (ed.), 'Non-formal Education and the Rural Poor'; Philip Coombs with Roy Prosser and Manzoor Ahmed, 'New Paths to Learning'.

For reading on distance teaching and nonformal education, a book written by the staff of the International Extension College covers the field: Michael Young et al., 'Distance Teaching for the Third World'.

For a shorter introduction to the subject, two of IEC's broadsheets on distance learning are appropriate: Tony Dodds, 'Multimedia Approaches to Rural Development', and International Extension College, 'Seeking the Barefoot Technologist'.

To complement these, another short publication: Emile McAnany, 'Radio's Role in Development: Five Strategies for Use'.

How adults learn

Stages of growth - Why we don't know much - Where we start - How we learn - Ways of learning - Cognitive learning - Learning motor skills - Affective learning - Age and learning - Summary

Our success in learning depends a great deal on environment, which varies from culture to culture. A task that one group of people finds simple another group will find impossible. (1) If something is difficult to learn, it is generally because it is unrelated to the learner's previous experience.

From the moment of birth, the environment stimulates the development of the brain. To begin with, babies learn to respond to other people in very simple ways, but they rapidly acquire skills and values which are conditioned by their environment. Parental attitudes, for example, have an effect on eating habits and on toilet training. Language acquisition is affected by how much people talk to their children and what they say. Physical development is similarly affected. Babies in Africa are traditionally carried around on the mother's back. It has been found that they learn to sit and walk earlier than babies not carried in this way; babies in Uganda who were put to sleep in cots during the day started sitting and walking later than children carried around. (2) It is thought that where children were carried, their sense of balance and their muscular control were developed through spending much time upright.

As the child grows, society shapes what she learns. In many traditional societies a child's education consists of acquiring a fixed body of knowledge and skills. (3) These are learnt informally through imitative play, listening to stories and taking part in family work. As soon as the child is old enough, from about 4 years onwards, she will start doing simple chores, under the supervision of an older child or parent. Her responsibilities will grow as she nears the age of 10, and soon after this she will be expected to work on her own initiative, practising the skills she has already acquired in preparation for adulthood. (4)

The twentieth century has brought rapid change to most parts of the world. Few today will reach the age of 10 feeling they are competent in the skills they will need as an adult.

STAGES OF GROWTH

As a child grows, we can discern stages in the development of his mind. At first the child relates to people and objects around him. Later he is able to make relationships between objects, and later still he learns to think abstractly. This process, known as 'cognitive development' is not strictly age-related, but it is usually complete between the ages of fifteen and twenty. It is partly a result of physical maturation, partly of the human being's will to learn and gradual accumulation of learning experiences, and partly of the stimulus of his environment. (5)

It is clear that the process is not simply a biological one. An environment may encourage people to use specific intellectual skills only in restricted situations. For example, a number of illiterate adults in Liberia were given a list of words in their own language and then asked to repeat them. (6) They were not very good at this - and yet people accustomed to the oral transmission of information are generally assumed to be very skilled at remembering. The test was then repeated with a different group, and this time the people were first given the words within a story, then told the list. In those conditions they were more successful at remembering the words.

The original free-recall test was then given to a group of people who had been to school and to a group of Americans. Both these groups remembered better than the first group. The experimenters suggest that by going to school these groups had developed the skill of inventing a suitable structure to help them learn lists. The unschooled people had techniques they used for remembering, but could not readily adapt these to an unfamiliar task.

Once we start looking closely at processes of thinking in different societies, many differences will emerge. Though the one study quoted does not allow us to draw general conclusions about memory among unschooled people, other studies indicate that such people often have difficulty in applying their thought processes to problems unusual in their culture. (7)

WHY WE DON'T KNOW MUCH

There have been a large number of investigations in what is called 'cross-cultural psychology'. (8) But, sadly, the conclusions of most are at best shaky, at worst partial. It is worth considering what has been wrong with the research.

First, most experimenters have used unsuitable tests and inappropriate tasks, originally devised for industrialised countries. Recently researchers have begun to develop more appropriate tests and experiments. The most substantial study of this kind to date is the one just quoted among the Kpelle people in Liberia. It was carried out by a group of psychologists and anthropologists, but they found it impossible to fit together all their discoveries: 'no comprehensive theory of the relation between mundane activities and cognitive processes has proved acceptable.' (9) For example, they were able to perceive and describe the subtlety of social relations amongst the Kpelle people, studying their ideas of debating and argument, but they only gathered scanty data relating these activi-

ties to the intellectual tasks they set as experiments. (10) But as we saw in the account of their experiments on memory, they tried to devise tests which were appropriate to the culture.

Second, until recently most studies of learning and intellectual performance done in less advanced cultures were comparing these societies with more developed ones. Some of these studies attempted to be impartial, while others were definitely racist. The conclusions of such studies still have a sinister influence on much thinking about the intellectual capacities of the rural poor: (11)

> The whole area of cross-cultural studies seems to need an overhaul because poisonous literature has infiltrated it, whereby African children are portrayed negatively as unintelligent, poor in the hard sciences, unlike children from industrial cultures. They are also portrayed as passive slow learners.

WHERE WE START

It does, nevertheless, appear to be true that some cultures offer more opportunity for developing intellectual skills than others. Two psychologists, Jerome Bruner and Patricia Marks Greenfield, put it like this: 'Some environments "push" cognitive growth better, earlier and longer than others.' (12) This does not mean that different societies produce less intelligent or more intelligent people, or that they offer inferior or superior learning environments. It simply means that they are different. Some societies, in contrast, value skills in social relationships more highly than intellectual skills. Over a number of years, people develop those abilities which fit with the dominant values and practices of their societies. It is hard for adults to start learning something quite unrelated to their previous experience.

The problem is to make new learning acceptable even if it is outside the range of people's intellectual experience. We have to find ways of bridging the gap between personal and community experience and new ideas. Training and teaching have to be in harmony with both the content and process of people's thinking.

Dialogue between teachers and learners helps to bridge the gap. While all good teachers enter into dialogue with their learners, Paulo Freire has evolved a teaching method, known as 'conscientisation', which depends on a particularly sensitive dialogue between members of a learning group and their leaders. This method is not simply theory, but grew from Freire's experience in Brazil and elsewhere. It is important for us on two counts: first, the method is designed specifically for those with no formal schooling; second, it is based on the firm belief that uneducated people are as capable as anyone of grasping difficult ideas, once they have learnt to use to better advantage the tool they already have, their command of their own language. (13) Freire believes that illiteracy holds people back from taking control of their environment. People are led to see the need for literacy by discussing concepts that are central to their lives. A series of ten pictures representing the key features of man's relationship with his world are used to start this process. With the help of a leader a group of illiterate people discusses each picture in turn. The first picture in the

original Brazilian series, and an explanation, are given in Figure 2.1

FIGURE 2.1 Paulo Freire's first situation: 'Man in the world and with the world, nature and culture'
The discussion starts with the question, 'What do you see in the picture?' The objects are named by the group to make sure that everyone can identify them.

Questions follow like: 'Who made the well? Why did he do it? How? What materials did he use? Who made the pig, the birds, the man? Who made the house, the hoe, the book?' The discussion moves to the conclusion that men use nature to change their lives, to create culture. The thought is not new to the group but the discussion helps them put the thought into words for the first time, perhaps, and clarify it.

As Freire's learners realise the full significance of each picture and how its subject relates to them, they are led to a deeper understanding of their position in society. This makes it possible for them to grasp the relevance of learning to read, realising that this skill will help them work towards changes. This is apparently a very intellectual approach, involving dialogue about principles and concepts, but it does not demand for its success a background of formal education.

HOW WE LEARN

Why is teaching like Freire's so effective? We have already established that this is largely because it is relevant and linked to experience, but it is also partly because is is in harmony with the process of learning. It is helpful to understand this process which, according to current theory, consists of the internal processing of information. (15) A simple description is as follows:

your attention is drawn by a stimulus;
you observe or register the material to be learnt, using one or more of your senses, and hold it temporarily in your mind;
you think about the material and decide what to do with it - how to classify it, which bits are important and so on;
some of the newly organised material is transferred to permanent memory. The rest falls away, forgotten.

All this happens very quickly and we are normally not aware of it. Later, material can be retrieved from memory. This usually requires cues to aid recall. Material that is unused for a long while may gradually fade away from the memory.

This theory leads to a useful description of our work as educators. Our job is to create the stimulus to learn, present the content, make easy the ordering of information, and aid its recall.

WAYS OF LEARNING

It is helpful to classify learning in three ways: cognitive, affective and motor learning - or, in non-technical language, thinking, feeling and doing. Cognitive learning is, as we have seen, affected by one's environment. Schools concentrate a great deal on cognitive learning. We can also talk about various levels of cognitive learning. At the lowest levels come simple responses like those of Pavlov's dogs, which learned to salivate at the sound of a buzzer. At higher levels it is useful to distinguish between the learning of concepts, of rules and of principles. We learn a concept when we begin to think in abstract terms - putting things or events or feelings into some kind of order or system of classification. Thus once a small child has learned the concept of 'red' he can classify his red pencil, his red rattle and his red front door in a way previously impossible to him. By a rule we mean an understanding of the relationship between a number of concepts while general principles are derived from a number of rules. In order to solve unfamiliar problems we usually need to start from general principles. While the lower levels of learning look simple - as when we learn vocabulary in a foreign language by learning lists of words with their equivalents - it is very easy to forget things learned at that level. In contrast, once we have grasped a principle, we are most unlikely to forget it. But each level of learning depends on the previous one. Rules defining the relationship between concepts cannot be learnt before the concepts themselves are understood; and general principles are derived from a number of rules, which must be learnt before the principles.

Affective learning is concerned with the development of beliefs, attitudes and feelings. Adults find affective learning particu-

larly difficult. Generally, they have already worked out their attitudes to most matters of importance to themselves and their society, while much education seeks to challenge and change these.

The third kind of learning, motor or psychomotor, is concerned with physical activity. Physical skills depend on practice, and it is difficult for adults to learn quite new physical skills.

Each kind of learning interacts with the others. A person learning to read learns to remember and identify the symbols used in writing and learns to interpret words and sentences. He also gathers information from what he reads, which can affect his attitudes and values, or stimulate an emotional response. A certain degree of motor learning is also involved, in training the eye to move across the page. Learning to write more obviously involves a new physical skill. Similarly we do not learn physical skills in isolation. In order to ride a bicycle, we must achieve balance and master the procedures needed for moving and steering it. Once we take the bicycle on the road, we have to learn the rules of the road and learn to anticipate events. Affective learning is also involved, in learning to co-operate with and be considerate towards other road users.

This division into three types of learning helps us plan teaching. First, it helps us determine what to teach and how to teach it. Once a teacher has decided on his goals, he must consider how the learners will demonstrate that they have achieved those goals, and consequently what they need to learn. To do this he will analyse the proposed teaching in terms of specific learning objectives, breaking it down into its component parts. Such an analysis is likely to reveal that all three types of learning have a place and he will be able to organise teaching better. For example, in any kind of health education the three kinds of learning are all involved. To understand the causes, the course and the prevention or cure of diseases requires cognitive learning; the treatment requires motor skills; and the learner may need to change her attitude, or may need to cope with emotional reactions. The teaching has to be planned to include instruction on all the relevant learning objectives.

Second, effective teaching respects the need for order in instruction. It starts with the simple or specific and moves towards the more complex or abstract. It proceeds in small steps, allowing each to be learnt before the next is introduced.

Third, the goal of teaching should be towards the solving of problems and the understanding of principles on which that depends. Once people have understood relationships, principles and processes, that knowledge is less easily forgotten than isolated facts. Moreover the person who learns to apply principles and rules in order to solve problems, and who can apply skills learnt in one context to another, has acquired a valuable degree of intellectual independence.

Each type of learning is more likely to take place if a particular set of conditions obtains. Conditions within the learner usually consist of things the learner needs to know already before he can absorb the new item. For example, we cannot learn a rule if we have not previously learnt the concepts contained in it. External conditions must provide an appropriate stimulus to learn, and

must reinforce the learning as it takes place, enabling the learner to demonstrate what he has learnt.

COGNITIVE LEARNING

Some general conclusions can be drawn about conditions which support cognitive learning. The American psychologist, Robert Gagné, has suggested that effective teaching depends on the following:

1 Gaining and maintaining attention.
Ways of gaining attention include an interesting change of style or subject, or an appeal to the dominant interests of the learners. Attention is held better if it is limited to one idea at a time.

2 Ensuring recall of previously acquired knowledge.
Reminders in the form of summaries or questions help do this.

3 Guiding the learning.
Verbal or pictorial material can provide cues that lead towards new principles.

4 Providing feedback on accomplishments.
Feedback reassures the learners by confirming that they are making progress. This is possible only if there is a statement of learning objectives.

5 Establishing conditions for remembering and applying what is learnt.
Reviewing the material learnt, and applying new principles to a series of problems.

6 Assessment of outcomes.
Exercises and tests provide for this. (16)

These rules are undoubtedly helpful, but they will not solve all our problems. As Gagné puts it: (17)

> learning theory does not ... say exactly how these are to be put together in the great variety of specific instances to which they are applicable. What learning theory tells us is that when certain of these conditions are present, learning will occur, and when certain conditions are not present, learning is improbable.

Two examples, both mentioned previously, illustrate how supportive conditions can encourage learning. First, the recall test with Kpelle people. In one test a group was asked to recall a list of items; in the second test, the same items were embedded in a story. In the first test the people performed badly, but we can now see that it was not the task that was at fault, but the conditions in which it was presented. The people were well able to memorise a number of items, but the original list was not of a kind that was familiar to them. They lacked an appropriate cognitive strategy, and could not transfer the strategy they would use for recalling lists in everyday life to this list of disparate items. They needed a context to work in. Once the words were set in a framework which aided remembering, they were able to recall the words much better.

Next, Freire's process of 'conscientisation' started at the level of concept learning. The pictures create an ideal precondition for such learning, 'a variety of different stimulus situations', as Gagné puts it. In addition the pictures are so direct in their

communication, and the leading questions put by the group animator so fruitful, that the learners have little difficulty in understanding what they should be doing. The discussions together with the pictures lead them to discover relationships between concepts. From the initial discussion of the relationship between culture and nature (see Figure 2.1), the group goes on to consider man as a maker of words. It looks at a picture containing the words of a popular song, and realises that the words of ordinary people can be written down, and can be as much poetry as the words of educated people. Several more discussion sessions follow, each focused on a different picture. The last picture shows a study group, leading the members to reflect on their own activities in the group. In previous discussions, people have begun to define ways in which their lives can be improved. Now they refine those definitions and decide what action to take. They gather together their observations and ideas, assess them, and search for solutions to their problems. They see that one way that they can help themselves is by learning to read. (18)

The learning described in the Freirean groups moved quickly to the highest level, where principles are discussed and problems solved. It is particularly interesting since the group members are unschooled people, those whom the more disparaging might consider to lack such learning capabilities. But the conditions in which their learning takes place are so favourable that the learners can undertake and succeed at difficult intellectual tasks.

LEARNING MOTOR SKILLS

Motor skills are often neglected, particularly those termed 'fine' skills - the skills required to get your tongue round a strange sound in a foreign language or to manipulate a pen as you write. In one literacy project, for example, an unexpected problem was that people got cramp in their fingers from holding pens. (19)

Repeated practice is needed to learn motor skills. Through practice, performance of a task is gradually improved until it has been mastered.

AFFECTIVE LEARNING

It is always difficult, and especially so in distance education, to guide affective learning. For such learning to take place, learners must first become receptive to new opinions and then choose whether or not to alter their attitudes. Naturally, adults will only change their attitude to matters of personal importance if they are convinced that it makes sense to do so. They are more likely to be open-minded if ideas are presented in a personal manner. For example, someone demonstrating certain desirable or undesirable behaviour will stimulate people to reassess and perhaps change their attitudes. (20) Such a demonstration can be presented through media but subsequent face-to-face discussion is desirable.

AGE AND LEARNING

The wide experience of adults helps them to learn. By relating new information to that wider experience they can often understand and learn more quickly than young people. Naturally the effect of age on learning varies greatly. (21) If you keep practising a skill, whether cognitive or motor, you retain your competence at it. But new cognitive learning becomes a little more difficult from quite an early age. Our memories become less efficient. From the age of about 30 onwards, long-term memory is more intermittent and it becomes more difficult to sustain a logical argument, though immediate memory of events or facts close at hand is hardly affected. Tasks that involve the formation of new associations, for example the learning of a language, are the most seriously affected. But this physical deterioration always has to be set against the powerful advantages brought by experience. Older people may make decisions more slowly, but they may also make them more wisely.

Affective learning becomes much more difficult as one gets older. Attitudes become set, and it is very difficult to accept ideas which do not fit with them. Nonformal education may need to challenge set attitudes. For example, spacing or limiting the number of children in a family may bring immediate benefits, but it may involve rejection of traditional attitudes. Or a campaign to prevent the spread of tuberculosis may advise against eating and drinking from communal containers, in a society where the sharing of food in this way is seen as symbolic of social harmony.

As we grow older we need longer to learn any new motor skill. In 1953 trams were replaced by buses in south London and the drivers had to be retrained. Almost all the drivers between 56 and 60 learned the necessary new skills, though half of these needed between one and four weeks longer training than the younger men. Two-thirds of the drivers over 60 also learnt successfully to drive the buses. (22)

SUMMARY

Learning is influenced by environment. In different cultures certain skills are developed to a great extent, while others are underdeveloped or ignored. As children grow up, they gradually learn to cope with more complex thought processes. We know that these are shaped by culture, but know little about the different patterns of development that occur.

While skills and interests vary between cultures, the process of learning is common to everyone. Teaching is only likely to be effective if it takes account of the conditions necessary to support learning: these vary with different types of learning.

In adults, what is already known well stays known as one gets older. Though one's brain slows down over the age of 30, this is largely compensated for by experience. Older people are slower at learning, but not significantly worse than younger people. Older people have particular difficulty in accepting new ideas that do not fit in with their attitudes to life, and the promise of immediate benefits is likely to increase motivation.

There are always a number of important questions to be asked about learning. Some are about the learners: what sort of cultural background do they have, and what does this indicate about their present learning skills? What sort of educational background do they have? What ages are they? Some questions are about the proposed learning programme: how does it relate to cognitive, affective or motor skills the learners already have? What further skills will they need to be taught? In the next two chapters we shall be concentrating on the implications of the first of these questions - the importance of cultural background. We concentrate first on language and how it affects our thinking.

BACKGROUND READING

For learning and cognitive development, the ideas of the following are important:

Jerome Bruner. Any of his work is recommended. Particularly relevant are 'Toward a Theory of Instruction'; 'The Relevance of Education' and The Nature and Uses of Immaturity.

Jean Piaget. His writings are extensive, but a number of collections of extracts are available. J.H. Flavell, 'The Developmental Psychology of Jean Piaget' provides a summary of his ideas. D.M.G. Hyde, 'Piaget and Conceptual Development' and Patricia Marks Greenfield, Recherche interculturelle et théorie de Piaget, provide accounts of the application and development of his ideas.

Paulo Freire. 'Pedagogy of the Oppressed' is a developed account of his philosophy. Briefer accounts are in 'Cultural Action for Freedom', 'Education: the Practice of Freedom' and 'Pedagogy in Process'. For a clear explanation of Freire's literacy practice, see also Cynthia Brown, 'Literacy in 30 Hours'.

On different theories of learning, Robert Gagné's 'The Conditions of Learning' (3rd edition) provides an excellent summary of other theories besides Gagné's own.

On learning and different cultures Cole, Gay, Glick and Sharp's 'The Cultural Context of Learning and Thinking' is of primary importance. Also useful are Greenfield and Bruner's Culture and Cognitive Growth, and Cole and Bruner, Cultural Differences and Inferences about Psychological Processes.

On adults learning, Jennifer Rogers's book, 'Adults Learning', is highly readable, while Simone de Beauvoir's 'Old Age' contains a survey on older people and learning.

Language, culture and learning

Implications for education - The problems of language choice in multilingual societies - Language skills in multilingual societies - Language development - Summary

Language is central to learning and a prerequisite for most human communication. The way in which languages serve those universal functions varies from country to country, from culture to culture.

A language develops to enable people to talk about things important to them. This sounds obvious, but it has important consequences. If we look at the vocabulary of a language, or at usage in a particular region, we find that a large and precise vocabulary will have been developed to enable extensive communication on what is most important to the culture. (1) Some examples are the large numbers of words for different forms of snow amongst Eskimos, and the many words to do with camels in Somali. We might compare these sets of words with the sets of technical terms an electrical engineer or a computer scientist will handle with ease, but which the outsider will find bewildering. However, there is an important difference: the Eskimo who discusses snow with precision is not an unusual specialist, her wide vocabulary is common to all the people of her culture. If a foreigner starts to chat with her about the weather, she will probably find the outsider's observations vague, puzzling or even meaningless.

Language use reflects social structures and relationships. (2) We may use different modes of address for slight acquaintances and for members of our family. If we are talking to our prime minister we will use our 'best' language; that is, we will use elegant and formal forms of our language. Such different styles of speech are known as registers. If we are talking with our close friends we will talk in an informal register, and our sentences will follow the flow of our thoughts, often in a rather untidy way which would not look good written down. Written language tends to be more formal than spoken. There is a scale of registers in any society. Occasionally registers are clearly distinct: in some societies, for example, men and women have different forms of language private to each sex. People generally understand the different registers in

their language, but do not necessarily use more than a very limited range of them. Formal styles may often be used only by the elders in traditional societies or the highly educated in modernised societies.

Educators need to find the appropriate register. For example, talking about sexual matters in public is unusual in many societies. Different strategies are developed for discussing such matters, from the British schoolchild learning the terminology through a study of the reproduction of rabbits, to circumlocutions, as amongst the Luganda people of Uganda, where riddles and proverbs are often used for anything to do with sex. (3)

IMPLICATIONS FOR EDUCATION

Culture shapes language and in its turn language expresses culture. This relationship can help in the design of the curriculum. Effective teaching starts with the familiar, and everyday language by definition talks about everyday matters. If we are not certain of the concerns and priorities of our learners, we may discover these simply by listening to their conversation. Just as modern curricula prescribe that children should start their study of science through observation of familiar features of their environment, so Freire's literacy teaching also starts with the exploration of familiar language.

Work done in Brazil by Freire and his colleagues shows clearly how people's interests can be culturally distinct within one country with a common language. In a Freirian literacy group, after the first stage of learning described in Chapter 2, a set of key words is used to teach people to read. Between them, the words represent all the common syllables in Portuguese. As each member learns new syllables, he can combine and recombine them to make new words. The key words are chosen because they are important to the learners, and therefore more easily remembered. Figure 3.1 gives four lists, used in different regions of Brazil; only three words appear more than twice, and most appear only once. Different things are obviously of different importance in different regions.

FIGURE 3.1 Four lists of key words for literacy used in Brazil (4)

List 1 Used in Cajueiro Sêco, a slum in Recife		List 2 Used in Tiriri, an agricultural colony in the city of Cabo	
tijolo	brick	tijolo	brick
voto	vote	voto	vote
siri	crab	roçado	manioc field
palha	straw	abacaxí	pineapple
biscate	odd job	cacimba	well
cinza	ashes	passa	raisin
doença	illness	feira	market
chafariz	fountain	milho	corn flour

máquine	machine (sewing)	maniva	kind of manioc
emprêgo	employment	planta	plant
engenho	sugar mill	lombriga	roundworm
mangue	swamp	engenho	sugar mill
terra	land, soil	guia	guide (for a blind person)
enxada	hoe	barracão	small store rooms near market place
		charque	dried meat
classe	class	cozinha sal	kitchen salt

List 3 Used in Maceio, a city on the sea		List 4 Used in the state of Rio, a rural area and satellite of the city of Rio de Janeiro	
tijolo	brick	favela	slum
voto	vote	chuva	rain
casamento	wedding	arado	plow
carroça	cart	terreno	plot of land
peixe	fish	comida	food
jangada	fishing boat	batuque	popular dance with African rhythms
balança	scale for weighing fish	poço	well
Brasil	Brazil	bicicleta	bicycle
máquina	machine (sewing)	trabalho	work
farinha	flour	salário	salary
coco	coconut	profissão	profession
fome	hunger	govêrno	government
comida	food	mangue	swamp
sindicato	union	engenho	sugar mill
trabalho	work	enxada	hoe
limpeza	cleanliness	tijolo	brick
		riqueza	riches, wealth

The knowledge gained from a study of language, whether informal or structured like Freire's, can help shape a curriculum. Observations about language use may stimulate the design of a curriculum with language as the starting point, as in Nigeria where research showed that an elementary physics curriculum could, if desired, be organised almost entirely round popular proverbs and sayings. (5) Or language may be used as an indicator, along with other factors,

of important concerns with results as in Honduras, where the radio school Acción Cultural Popular Hondureña has designed a curriculum for adults based on the annual agricultural cycle; (6) or as in Liberia, where a primary-school maths curriculum has been derived from traditional modes of measuring and calculation. (7)

Finally, people learn more easily in the language most familiar to them, their mother tongue or first language. (8) Most bilingual children have a dominant language, and at school they do better in their stronger language. The same is true of adults; simultaneous interpreters, with advanced competence in two languages, are able to cope less well with complicated ideas when these are presented in their second language. (9)

THE PROBLEM OF LANGUAGE CHOICE IN MULTILINGUAL SOCIETIES

Some countries have a dominant national language, others have a number of languages spoken by different large groups. The next task therefore is to look at possible patterns for language use in education in multilingual countries.

Things are seldom simple. If we wanted to broadcast radio programmes to farmers in a large multilingual country we might take a map of political regions, a map of the distribution of language groups, and a land-use map and compare the three. When the director of All India Radio Farm and Home Broadcasting did just this, he found that the three types of boundary criss-crossed, so that it was no easy matter to provide relevant farming programmes for each region. (10)

Linguistic boundaries seldom coincide precisely with political boundaries. In any country, there are often small groups speaking a different language from that of the majority. Some may live in a remote area; there are other peoples such as the Fulani in West Africa who may settle in family groups scattered amongst villages where a different language is spoken; in urban areas there is often a mixture of people speaking many languages.

In many countries it is therefore difficult to offer education to adults in their own language. And there are further practical problems in doing so. Many languages have never been written down. In some cases, work may be under way to provide a written form. If a language is spoken only by a few thousand people, or if it is spoken by larger numbers but with a number of regional variations, it may be considered uneconomical to develop a written form. Sometimes a political decision may prevent the development of a written form of a minority language; a concern for national unity may lead to a policy to encourage the use of one national language. (11) In such a case the choice is between restricted educational activity in a minority language, and more extended education in a second language which is more difficult for many learners.

A slightly different problem arises when different forms of a language exist side by side. In Jamaica there is a continuum from Jamaican creole to a formal spoken West Indian English, which in turn differs slightly in accent and vocabulary from British English. It is no easy matter to determine which form of the language is acceptable, politically or educationally.

LANGUAGE SKILLS IN MULTILINGUAL SOCIETIES

People see languages as having different functions and will often switch from one language to another as the context requires. A study in West Africa, for example, has shown that English phrases slip into Yoruba conversations at work where the English terminology is more familiar than its Yoruba equivalent. (12) An example is a formal threat to dismiss an employee, in Yoruba but with the English phrase 'without further warning'.

A language of high status becomes associated with success. People sometimes prefer education to be in a high-status language rather than in their own familiar but low-status language. In Haiti, for example, French is preferred to the widely spoken Creole. (13) (Sometimes, of course, a high-status language is preferred simply because it is more useful; some Latin American Indian populations prefer schooling in Spanish for this reason.) (14)

How easy is it to learn in a second language? It is often fairly easy to learn the languages of people who live near to you. Neighbouring languages often have common features of intonation, sentence structure and even vocabulary. So in an area where there is one major language but pockets of minority language speakers, the latter are fairly likely to be able to speak in the major language. But those who have some knowledge of several languages may only make a restricted use of each. At home, they use their first language, while outside the home, in everyday affairs they will probably use the dominant language of the region. In more formal contexts, in encounters with doctors or civil servants for example, they will probably use the official language of the country. They are likely to have difficulty in using each language in an unfamiliar context.

It is generally agreed that basic education ought to be provided in the first language of learners. But where this is difficult, a second language can be effective. Learning about nutrition, for example, in the dominant language of a region may be useful to people who use that language when doing their shopping. Some topics, too, may be easier to teach in a second language. In family-planning education it may sometimes be more acceptable to talk about sexual matters in a language where traditional linguistic taboos are by-passed. But the opposite may also apply: certain topics may be quite unacceptable in any but the learners' first language. There are no easy answers to questions of language choice.

Political and economic factors often preclude some choices. Distance teaching must work on a large enough scale for economic viability. Often we will have to opt for using a major written language which is not common to all our learners but at least is nearly related to the first language of minority groups. Sometimes we will have to use a language such as English, French, Spanish or Portuguese which has no relationship at all with the Latin American, Asian or African learners' first language.

As a rule of thumb, information can generally be communicated in any language people understand, but discussion in one's first language is usually essential if a significant change in attitudes or practices is to take place. But above all it is essential to

communicate clearly in whatever language is used. We need therefore to look at how languages develop to enable the expression of ideas new to a culture.

LANGUAGE DEVELOPMENT

As cultures change, languages change. To some extent this is a gradual diffusion of new words and expressions into a language, generally derived from existing roots. Where a language has long been used for academic and scientific work, this is enough. With many other languages, however, a more deliberate planned development is necessary. For the impact of modern technology has been sudden. Even basic technical terms do not yet exist in many languages. In the recent Unesco Experimental World Literacy Programme simple materials for use in India were translated into nine different languages and even at this level a number of new words had to be coined. (15)

There are two main methods of coining words. First, foreign words, adapted into local forms or simply borrowed, can be introduced. The advantage of this, at least for technical terms, is that internationally recognisable vocabulary develops; however, such words may be difficult to absorb and learn. The second method derives new words from others already in the language and these are more easily memorable and comprehensible. One technique is to reinterpret existing words. For mathematics teaching in Kiswhahili a word was needed for 'diagonal'. Somebody observed that local carpenters had a term for the support they put across rectangular frames to keep them rigid. This was adopted as the general mathematical term for 'diagonal' - a word already in the language, but which now acquired a new meaning. (16) Similarly, a word can be made up from all or partly native components, but in this case the form of the word is suggested by a word in another language. This technique, known as calquing, is frequently used in many languages, though it is rare in modern English. One example is 'almighty', a copy of the Latin word 'omnipotens'; both words consist of two elements meaning 'all' and 'powerful'.

Many countries have established agencies for language development which may be able to assist with problems in education. In practice, however, some problems cannot wait. Where it seems impossible to find relevant and clear language to express an idea, it is useful to reconsider our approach to the subject. There may be an alternative that is more closely linked to people's existing preoccupations, and requires after all only familiar vocabulary.

SUMMARY

If the subject matter of education is related to experience, learning is more likely. Words which are in frequent use give some indication of what is important to a community. If we concentrate on using these words, and follow the normal speech patterns of our learners, our materials are likely to be in harmony with local life style.

Where more than one language is commonly spoken, the priority is to use the first language of learners. Where this is not possible, we should select if we can the alternative language which is most nearly related to the first language of the majority. We need to take into account the limited expertise many people will have in a second language.

With some languages we may meet with difficulty in finding the vocabulary we need. We can sometimes overcome this by finding an alternative approach to a topic.

BACKGROUND READING

Two particularly useful publications, both with practical needs in mind, are: Kenneth Baucom, 'The ABCs of Literacy: Lessons from Linguistics', and 'Prospects', vol. VI, no. 3, 1976, Special Issue, Elements for a Dossier: Schooling in the Mother Tongue in a Multilingual Environment.

For further reading on culture and language use, there are a number of collections of papers, any of which are interesting to dip into: W. Whiteley (ed.), 'Language Use and Social Change'; J. Spencer (ed.), 'Language in Africa'; J. Spencer (ed.), 'The English Language in West Africa'; T.P. Gorman (ed.), 'Language in Education in Eastern Africa'; P.P. Giglioli (ed.), 'Language and Social Context'. If you prefer a general introduction by one author, both the following are clear and thorough: D.I. Slobin, 'Psycholinguistics'; P. Trudgill, 'Sociolinguistics'.

For a collection of mainly anthropological essays try Dell Hymes (ed.), 'Language in Culture and Society'. An important essay from anthropology is J. Goody and I. Watt, The Consequences of Literacy, included in Giglioli's collection.

The cultural content of learning

Investigating a culture - Implications for education - Values and education - Summary

An underlying assumption of this chapter is that education will lead to cultural change. How can change and tradition be reconciled? What can each culture tell us, to help us select and arrange teaching? Is it possible to work out any general principles to help us in deciding what is more important, and what less? Can we find ways of easing the transition from old to new or of providing for their harmonious co-existence?

INVESTIGATING A CULTURE

The culture of each group comes from its social, economic and political organisation and its systems of moral and religious belief. We need to discover the characteristics of the group we are working with before we can plan education for change. The reports of sociologists and anthropologists are likely to help us to gather enough information to make a start. The picture given by such reports may be far too general at first, perhaps resembling this list, drawn up by the Latin American educator, Luis Ramiro Beltran: (1)

> I have been scanning the literature that tries to describe the peasantry in the underdeveloped lands. I found myself with 13 personality traits:
>
> 1. traditionalism
> 2. fatalism
> 3. no future orientation
> 4. low need for achievement
> 5. lack of entrepreneurship
> 6. passivity
> 7. resignation or conformity
> 8. lack of risk-orientation
> 9. no thriftiness
> 10. superstition

11. lack of creativity
12. submissiveness
13. distrust

... If rural people in my region have all these traits, or at least several of them, I give up as a communication specialist working to change anything in them. It would be just impossible!

Beltran's list, as his comments make clear, was drawn up deliberately to challenge the validity of over-generalised statements. It is clearly crude and negative, and yet all too often plans for education start with only this kind of background information.

A recent study shows how research can be used to refine just such a rough picture of a culture and to discover those features that are most important to consider in planning education. (2) Carol Mallette Amaratunga chose two superficially similar communities from Ghana and Sri Lanka. Each community was a village of similar size and structure, only a few miles away from a town. In each community similar nutrition projects were set up, and their progress studied. In both communities, villagers were apprehensive about the effects of change. The research disclosed that those who felt they could have little control over their lives were the least likely to make any changes as a result of the programme. Attitude to change was more important than educational background; neither the ability to read nor formal schooling made any difference to people's willingness to adopt new practices. In both villages roughly the same proportion of illiterate people and educated people benefited from the programme; and in both villages people judged the programme on its own merits, with little reference to influential villagers.

But this was not the whole picture; a survey of the villagers showed that people were engaged in a variety of learning activities apart from the nutrition projects. They were mainly interested in three areas: acquiring traditional knowledge and skills in topics like agriculture or medicine; learning how to maintain simple machinery; and acquiring occupational skills, through informal apprenticeships or other methods of training they could afford.

There were differences between the communities. In Sri Lanka the younger villagers were in general more progressive than the older ones, but in Ghana age made no difference. In Ghana the people who were most prepared to try out new ideas were those who had travelled most, who most frequently consulted external sources, such as the radio or agricultural extension agents, and those who were better off; in Sri Lanka none of these factors were significant.

Carol Mallette draws three conclusions. First, it is not necessary to concentrate on teaching opinion leaders; all villagers are potential learners. Second, demonstrations will help to convince those who hesitate to make changes; practical examples are a better counter to fatalism than speeches. Third, social or moral attitudes affect actions; in Ghana high priority is given to material status whereas in Sri Lanka the predominant philosophy is the anti-materialistic one of Buddhism. Carol Mallette goes on to point out that the decision to accept new ideas is taken rationally. There are practical and economic factors beyond the cultural ones that

influence such decisions. Villagers were most likely to try out new ideas which were culturally acceptable, economically feasible and introduced by a respected authority figure. They were most likely to reject ideas which contravened indigenous values and sanctions, were economically prohibitive and were thought to be difficult or impossible to realise.

This understanding of values and everyday practice enabled Carol Mallette to draw up guidelines for education in these communities. While these are of local relevance, the research has a much wider value. It demonstrates that such knowledge can be obtained without too much difficulty or delay.

IMPLICATIONS FOR EDUCATION

Effective education demands an understanding of the culture. We need to start by looking at surface level features of a culture. If we identify and reproduce in our materials accepted conventions of behaviour, people will be more likely to take the materials seriously. Educators need to respect the ways people in any one culture communicate with each other, taking account of conventions of greetings, of conversational structure and features of non-verbal behaviour. Such points matter in pictures as well as speech; in one country a poster showing a man taking his pay packet in one hand lost its impact since in that culture gifts are normally taken in both hands together. (3)

For much education, we need to study people's everyday lives. In nutrition, who collects the food or does the cooking? What are the conventions for serving and eating a meal? If, for example, people normally take food from a number of centrally placed bowls, then a lesson on a balanced diet will have a different conclusion from one for a culture where different foods are served to each person on one plate. In agriculture, which jobs do women do and which jobs do men do? What tools do they use most, and how do they use them? By looking at what people grow or eat, and how they do it, we can select and arrange suitable examples to teach nutrition or agriculture. Further questions need to be asked at a deeper level, to determine the implicit values of a culture. To do this, we can take pairs of opposing attitudes, such as the following, and ask which of the pair describes our community best:

conservative - progressive
material wealth valued - spiritual wealth valued
individualistic - community-centred
sense of personal worth - sense of personal unimportance

The point of asking such questions is to deepen our understanding of a culture - to discover, for example, which features or institutions demonstrate community or individualistic values.

We may find some of the answers by observing the style of formal proceedings or ceremonies, or examining artistic and literary traditions. Folk literature and ritual procedure of all kinds are the means by which aspects of culture are transmitted from one generation to the next. Investigation of them is likely to help us identify major cultural values. In the majority of western fairy tales, for example, the central character is a man, young, poor,

frequently weak, above all good. Through his personal worth, and with the help of the forces of good he achieves worldly success and a victory over evil. Moral goodness brings success; wealth and power are the rewards. Even today, these tales are a fair representation of how western society would like to see itself.

It will also help to consider how people behave in formal circumstances. How are arguments or court cases conducted? How are skills passed from one to another? How are important decisions made? Who are the community authority figures, and in what contexts do they make their ideas known to the community?

School also has its effects on behaviour in later years. The values implicit in a school system - often still the values of the colonial power that established it - are strongly impressed on those who attend and affect their attitudes to society and their perception of their place in it.

Analysis of forms of social behaviour and artistic traditions can also yield ideas for education. Traditional forms of literature, for example, can be used to teach new ideas. A folk tale contains a well-known story and firmly established values. Any alterations to it are clear to see and a powerful challenge to readers or listeners.

In ancient Athens, drama was very popular and regular competitions took place between dramatists, with audiences selecting the winners. Different plays told the same stories again and again - stories from Greek myth and legend. Everyone knew the stories well; what mattered in each play was the new slant given to the story. The same incident from the Trojan war could be presented to encourage nationalistic fervour among the Athenians, or it could be modified to stress the waste, destruction and personal tragedy caused by war. The shifts in emphasis came out strongly and directly just because the stories were so well known.

VALUES AND EDUCATION

Education communicates values. Sometimes it reinforces standard beliefs and practices; at other times, it challenges accepted values. Such conflict requires further discussion. Many educational programmes may run counter to existing social values. It is difficult to persuade parents to plan or limit their families if in their culture large families are considered desirable. It is necessary to seek values powerful enough to override the arguments in favour of having many children. If two respected values are juxtaposed in a new way, then parents may acquire a different perspective and alter their attitude to childbearing. For example, in one society both material wealth and large families may be highly valued, but for most people they may be incompatible. If the point is made that small families can lead to greater wealth, then people may change their attitude to having many children.

A further possibility is to draw comparisons between familiar procedures and new ideas; family planning provides another example. In the Philippines, family-planning workers had difficulty explaining the action of an intra-uterine device (IUD). A doctor realised it acted in the same way as the pegs used locally to control the growth

of new banana plants. The peg wedged in the stem inhibits growth only until it is removed, just as the IUD inhibits conception. The Filipino countrywomen immediately understood the analogy. (4)

Education can also be designed to harmonise with existing patterns of authority. A radio campaign in the Philippines exploited the fact that older women are generally respected by younger. An older woman presented new ideas for an infant's diet, and persuaded the younger women to try out her idea. (5) In another project in Britain, famous entertainers took part in television programmes pretending to be illiterate. The fact that a well-known and respected actor could sympathise with adults with reading problems helped encourage them to ask for assistance when reading. (6) In one project in Lesotho people preferred to follow the example of

A

B

C

FIGURE 4.1 Three families from Lesotho

others like themselves. Contrasting pictures were drawn for a family planning pamphlet. One showed a small and prosperous family, the other a large and poor one (see Figure 4.1, a and b). Some country people preferred the look of the family in rags: they could not identify with the other family. Picture (c) solved the problem. People could readily identify with this family smartly dressed in traditional Basotho costume. (7)

Another project that is organised to fit with dominant values is the South Korean Air Correspondence High School. Young people study the secondary curriculum at a distance. They study intensively and fast, with little tutorial or group support, and often at unsocial hours; many of them have full-time jobs as well. The system is effective. (8) However, such an impersonal and competitive system can only work in a society where the rewards for individual attainment are very highly valued or the penalties for failure severe.

It should be clear now that it is not enough to mimic in our materials the superficial aspects of a culture. Culturally appropriate education needs more than a picture with culturally correct detail or a local folk story as a hook on which to hang new ideas. The picture or the story may indeed help us, but the values they reflect and the values of the culture are at least as important.

SUMMARY

These examples, seen together with our knowledge of how people learn, suggest two important guidelines. On the negative side, do not offend people by making mistakes in describing behaviour. On the positive side, use what you know about local values to create a strong motivation to learn, to change, to take action.

We have seen that this implies being aware of how people behave, and why. We have seen also that getting a general idea of the values of a culture not our own should not be too difficult; we can find them out by our own observations, from existing books, or from talking to sociologists and ethnologists. Our initial analysis need not aim to be comprehensive, for two reasons. First, a detailed research study, though it would in the long term be valuable, would inevitably delay our educational activities by a matter of years rather than months. Second, questions of importance will become more sharply defined as our programmes develop.

Both selection of content and the way it is presented are important. The examples quoted have offered a glimpse of how these can vary with different cultures. In the following chapters we shall gradually build up a more detailed picture.

BACKGROUND READING

The ideas presented in this chapter derive from putting together a number of different sources. Some of the most useful are: Carol Mallette Amaratunga, Ghana and Sri Lanka: Indigenous Nonformal Adult Learning in Two Rural Communities; Lyra Srinivasan, 'Perspectives on Nonformal Adult Learning'; Angela Molnos, 'Cultural Source

Materials for Population Planning in East Africa'; Kunnie Kooijman, 'Bokaa: Living and Learning in an African Village'.

Planning for distance teaching

Defining needs - Defining objectives - Resources and constraints - Choosing between alternatives - Alternative methods of meeting objectives - Alternative subject matter - Choice of method - Development, evaluation and feedback - Summary

Distance learning needs to be systematically planned if it is to be effective and to make the best possible use of available resources. In this chapter, the systems approach given in Figure 5.1 is explained. (1) Although each stage is described in a particular order, in practice some stages occur simultaneously or in an order different from that described here. The approach should be seen as a framework for planning, to be adapted according to your circumstances.

DEFINING NEEDS

We need first to identify the learners. If ours is an agricultural programme, are they poor farmers, rich farmers, or extension agents? If it is a nutrition project, are they mothers of young children, village-level health workers, urban people or people who grow all their own food? If it is a family-planning programme, are they women or men, young or older, with many children or few?

Once we have decided who are our learners, we shall be able to describe them very broadly, in terms of sex, age or occupation. To plan effectively we shall also need to know the educational, economic and cultural background of a typical member of the group. What sort of education has he had? Can he read? Has he been to school? Is he poor or not? Does he rely more on wages or on his own agricultural activities to support his family?

The answers to such questions will affect planning decisions. If you cannot answer them, or doubt whether the answers you have are correct, you must find out more. You can do this at the same time as you investigate precise learning needs.

These are seldom easy to define. Until recently, few people tried; educators would decide what people 'wanted' to learn, and

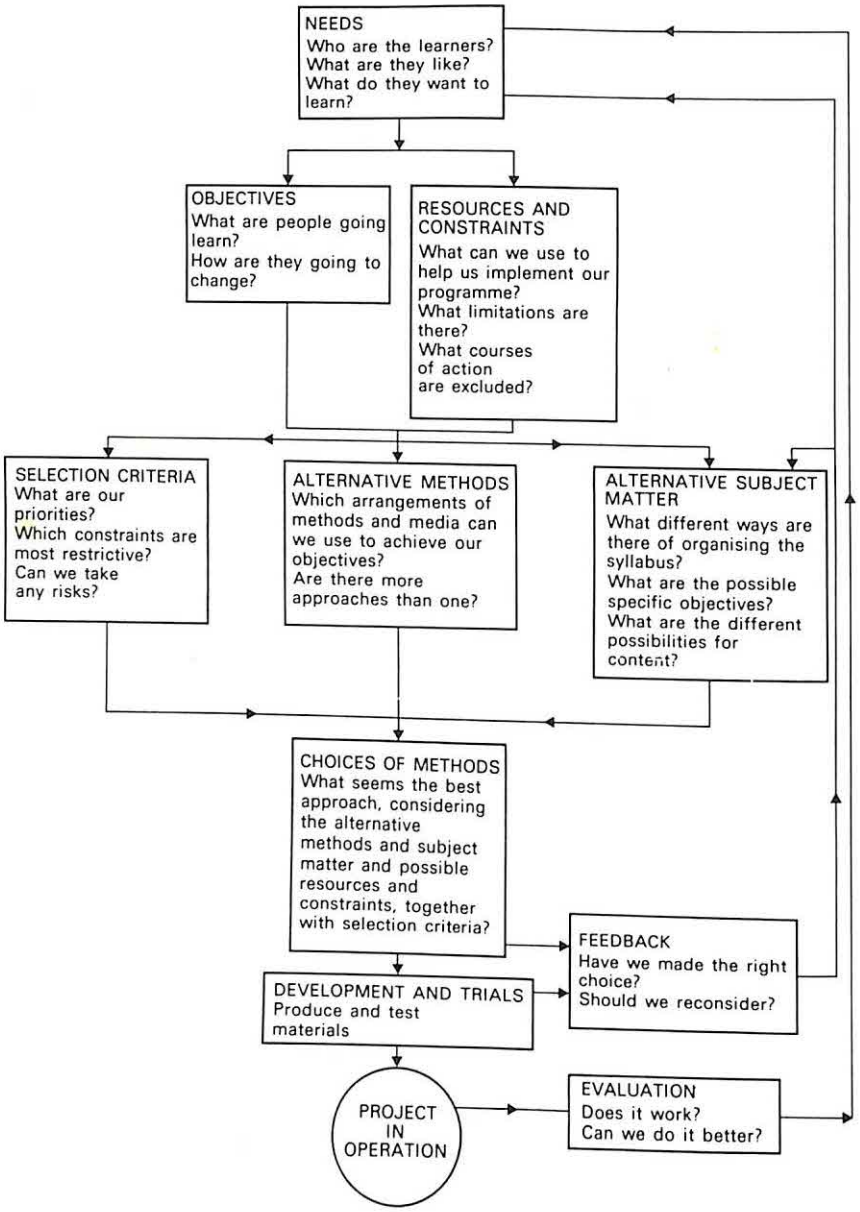


FIGURE 5.1 A systems approach for planning distance learning

attempt to teach it. This 'top-down' approach is gradually being replaced by an effort to find out what the real needs of learners are.

But one cannot simply ask people what they want and expect them to be able to tell us. Few of us are able to identify the roots of our own problems. Beneath a superficial answer, asking for a literacy programme may lie a wish to increase one's income. It may be easier to do this by improving farming techniques than by acquiring some formal education and looking for a hard-to-get job in the city. Potential learners may give a general answer, when a more specific need is the real priority, like the Brazilian villagers who became concerned about their health, and planned to build a health centre, but later realised their priority was the building of latrines to eliminate hookworm. (2) Or a problem may be posed to which the only answer is a political rather than an educational one, such as the redistribution of land in a country where only more modest changes in agriculture are practicable.

It is worth combining a number of different approaches. The first stage is to define the questions to be asked, although that definition will change as we learn more. (3) Then a simple way of making a start is just to go and have a look - meet our target audience, talk with them, learn informally about them. More formal group discussions may be useful. (4) Existing research, local or national, or comparative research on other people facing similar problems may help us. (5) And formal sample surveys of our potential students may fill out the picture we get from less formal methods or from the literature.

The Lesotho Distance Teaching Centre used the following approach to decide on topics for booklets to teach practical skills. Observation and survey were used to get answers rapidly: (6)

1. Preliminary observation to reveal obvious needs, e.g. need of rural women to earn money.
2. Simply asking people what they want to learn.
3. Moving from that to suggesting a range of subjects which people should know about and asking for comments, experiences and advice.
4. Decide what courses you are going to offer and tell people what you have decided.

Once a decision has been made, further research will usually be needed to discover how the topic should be treated.

A second example is one of larger-scale research, an attempt to devise a curriculum for basic education for adult villagers in Thailand. (7) The first stage was an attempt to gather together existing knowledge about village life. Village extension workers attended a workshop to decide on educational priorities. They returned home and for two months observed village behaviour as it related to those priorities. At a second workshop they were able to offer informed opinions on the relative importance of the different priorities.

The next stage was a survey to find out how far the workshop participants had been right in their perception of problems, and whether they had identified correctly the causes of the problems. In each case, how far did a common practice reflect lack of knowledge, or was the problem due to economic or social conditions?

Such an analysis could help define the areas where education could be most useful.

The next stage was to carry out a sample survey in 40 villages in order to check perception of village problems. The survey's findings supported the observations of the extension workers to some extent, but there was a general tendency for the workers to overestimate the ignorance of villagers. Many specific problems were not, in fact, due to lack of knowledge, as the workers had assumed, but due to social or economic factors. But the survey revealed a number of areas where specific knowledge was lacking and could usefully be taught.

Malnutrition, for example, was common particularly amongst pregnant and nursing mothers and young children. In the second workshop the participants had suggested poverty and ignorance as overall causes, and as specific causes that people ate the wrong foods, sold food rather than eating it themselves, did not wash their vegetables, and ate uncooked meat and fish.

The survey found that, while these observations were roughly accurate, the reasons for such behaviour were complex. Knowledge of food values was indeed poor. The survey pointed to instances where education could help: people threw away water in which rice had been boiled, not realising it contained nutrients; they often fed unsuitable solid food to babies, encouraging diarrhoea; and pregnant mothers frequently avoided body-building foods, from a traditional fear that the foetus would grow too large for safe childbirth.

On the other hand, most people did not wash their vegetables, but most also knew that dirty vegetables could cause disease. Their problem was not lack of knowledge, but the scarcity of water. Many people in one area ate raw fish and meat, but two-thirds of them knew this could be dangerous to health. They continued to eat this food because it was a traditional dish.

This research therefore enabled people to make a number of useful decisions on the learning needs of the villagers. The process of the research also had useful practical results. The extension workers involved in the research learnt a great deal themselves through having to question their own assumptions and revise their attitudes. And though the participation of the villagers themselves in the research was limited, there was the beginning of a new relationship between extension workers and villagers.

There is no one ideal method for defining educational needs, and these examples have presented contrasting approaches. Unless a particular need is already clearly defined, some such investigation has to take place before further project planning is possible.

DEFINING OBJECTIVES

The next stage in planning is to define objectives. A statement of a project's objectives describes what people will be able to do at the end. We need to do this to clarify our aims. We shall also include in our definition changes in attitudes, although such changes are far more difficult to define than straightforward changes in behaviour. Often confusion and disagreement about

objectives can be resolved by checking whether proposed aims can be defined in terms of what a successful student will be able to do.

To return to the Thai curriculum, the survey suggested several topics for a nutrition education programme. We might choose to start, for instance, with a campaign for mothers of young babies, with the intention that they should learn to choose and prepare suitable solid foods and to identify those foods and modes of preparation that are unsuitable. We are attempting to select a limited objective and one that is directly relevant to people's needs.

Sometimes it is simple to define objectives. But generally on careful analysis, many objectives turn out to be broad and complicated. This is where background information about learners is so important. It is impossible to define appropriate aims without knowing how much people know about the subject already, what their attitudes to it are, what their practices are.

Even if our objective appears to be limited to one clearly defined change in behaviour there may be other unforeseen ramifications. One innovation can bring with it many other changes. Margaret Mead, after 50 years' experience as an anthropologist, had this to say: (8)

> One of the things that is most disastrous about social change is changing a few things and not changing the other things that need to be changed with them. There is quite a good analogy in how we treat a sprained ankle. If you sprain your ankle, the thing that does the harm is your trying to walk so it does not hurt; but if you shoot a local anesthetic into the sprained ankle it gets well almost at once. It is the *adjustment* that does the harm and not the original injury. Most of the disorganization that has happened around the world has been due to the discrepancies, the disparities in change, the things that did not get changed together. For example, take the people who got cloth but did not get soap. If you are going to have cloth, you have to get soap or you end up dirty! And there are people who got cloth but no soap or no needles or thread; they ended up ragged and dirty. And if you're going to have cloth you not only need soap and needles and thread, but you need a pocket handkerchief.

We must therefore be careful in defining the objectives of a project not to look at these too narrowly. If we allow ourselves to become too rapidly involved in details of subject matter we may fail to see the wider consequences of our aims. A common mistake of this kind occurs when people write correspondence courses leading to examinations. The prime objective is easy to define - that the students should be able to pass the exam. The writers infer that this simply means teaching the prescribed syllabus and start by reading this through and organising the subject matter. They forget that in order to pass the exam the learners will require certain study skills, which will have to be taught, and should therefore be included in the objectives. (9)

At this stage in planning we are not concerned with methods. Once we have decided on educational aims appropriate to our learners, we can plan how to achieve our objectives.

RESOURCES AND CONSTRAINTS

When we have a clear idea of what we are aiming to achieve, we can make realistic decisions about methods, considering what resources are available and what constraints there are on their use. 'Objectives' and 'resources and constraints' are set side by side in Figure 5.1, to indicate that these two stages are interdependent. Sometimes, you will select objectives and then select the best way of meeting them. At other times, particular constraints will exclude certain methods or certain objectives. If, for example, there is no written form for a language, you cannot plan a literacy campaign in it.

1 The learners

We already have a general picture of what the learners know about our subject. We may need to gather more information. Once a suitable topic is defined, further research is needed on local practices, on existing knowledge and prevalent attitudes towards the topic. We also need to make sure we have sufficient information on the setting where learning is to take place. What material facilities are available? For example, how many radio sets are available? Is there an existing building such as a school where group meetings can take place or will they be in the open air? We must check the financial situation of learners. Can they pay for their course? If so, how much? And we must discover all we can about local people who may be able to help. Are there any wide networks of existing groups we might work through? Will it be easy to identify people in villages who can act as group leaders? Will we ask extension workers or village schoolteachers to help us, and if so what do they need to learn in order to help effectively?

2 The media

We should list all media available to us, including, perhaps, print, broadcasting, drama and films, and consider different ways of using each. We do not yet select which we will use as we need more information to decide. But we need to ask ourselves about the constraints on each of them. Is each medium available to all the potential learners? Which come within the range of our budget?

3 Language

Which languages are used amongst our learners? Which are the major ones? Is one language common to all? Are there specific constraints about using any particular language? For example, are any unwritten, or any politically or socially unacceptable for education?

4 Money

How much money is available to spend on the programme? Is this a fixed amount? Are there any possibilities for getting some services free, such as air time on the radio or postage?

5 Distribution facilities

How shall we be able to distribute materials? Is the post efficient? Where are there electricity supplies, and who has access to mains electricity? What is the range of broadcast signals, and what is reception like?

6 Manpower and administrative facilities

How many teachers, broadcasters, writers, field workers, radio technicians and so on do we have available? How do we recruit them? What can we reasonably expect them to do? What sort of administrative capacity do we have? What scope is there for co-operation and co-ordination between different relevant government ministries or with any other suitable organisations?

7 Time

How long do we have to prepare the programme?

This is by no means an exhaustive list of factors to be considered. We must gather together as much information as possible to allow us to make sensible decisions. Planning involves choice. The more relevant information we collect, the better informed our choices will be.

CHOOSING BETWEEN ALTERNATIVES

It is usually possible to work out a variety of different ways of reaching the same educational objective. We may, for example, try quite different mixes of print, broadcasts and face-to-face study with teachers or group leaders, or we may do everything face-to-face. It is therefore necessary to choose between alternatives and, if our choice is not to be entirely arbitrary, to define the criteria by which we will select. Our aim may, for example, be to seek the cheapest method, or the one that reaches the largest number, or the one that is most effective with one minority within our total audience.

ALTERNATIVE METHODS OF MEETING OBJECTIVES

There are likely to be a number of possible ways of running a distance-teaching project, and we should consider more than one. For example, a national campaign on health education could have centrally produced radio programmes and booklets, to be used in village groups; or it could have locally produced booklets with national radio; or radio programmes for village health workers and posters and pamphlets for use with villagers. There are many other possible combinations when other media are considered as well.

ALTERNATIVE SUBJECT MATTER

Just as we are faced with problems of choice about method, so we must choose the content of what we teach: there is seldom a predetermined curriculum. A nutrition project for mothers could include facts about foods, examples of recipes with or without explanation of the nutritional content, emotional appeals through stories of infant malnutrition and disease, information about growing vegetables or advice on kitchen equipment. We need to think about the various possibilities and select the most appropriate.

A ready-made curriculum does not give us all the answers even in formal education. There are, for example, particular problems in teaching physics to adults studying at home. In school, knowledge would be built up from laboratory experiments. At home, the same syllabus has to be covered but the students cannot perform the same experiments. The course tutor must use different topics or different examples to explain certain points; he must devise experiments learners can do at home, or suggest appropriate observations as a substitute for experiment. Some topics may not be well taught without some laboratory work. Perhaps it will be possible to teach these at a seminar or short course and, if so, the order of the syllabus may have to be rearranged. Certain topics may need to be timetabled to occur before or after the seminar work.

With science teaching, the constraints imposed by distance teaching are clear, and these force us to consider alternative approaches to the subject. With other subjects there may be less pressure to consider alternatives but we should not overlook them. If we do, we may ignore important dimensions of our teaching.

CHOICE OF METHOD

This is the stage at which the programme takes shape. Alternative methods and content are considered together with all the resources and constraints. We can exclude possibilities that do not fit with our selection criteria. We then decide on an approach which we think will work.

DEVELOPMENT, EVALUATION AND FEEDBACK

At this stage, planning moves into production, with the development, testing and use of materials. As students start work, we need to monitor the course's effectiveness so that it can be changed or improved.

Before we leave the subject of planning there is one more stage to consider. Some stages in Figure 5.1 are so closely linked that they are set on the same level and linked by arrows. A line goes from the box marked 'feedback' back to each of the different stages. As we gather information and make decisions we may find that a choice made earlier on has to be reconsidered. We need to be ready at any stage to modify our plans as new facts come to light.

SUMMARY

For distance learners careful planning is essential. Materials once made cannot be easily changed, and they are useless if they do not teach. For the organisers, planning is also important. Resources must be used sensibly, especially as setting up distance teaching demands a great deal of irretrievable expenditure.

This chapter has described the systems approach to planning for distance learning, and has considered the earlier stages in some detail. It has looked mainly at what we should be doing, and why. The next chapter, on different media, is more concerned with deciding how to teach.

BACKGROUND READING

Several International Extension College publications discuss planning for distance education: Hilary Perraton, 'The Techniques of Writing Correspondence Courses', for planners and writers; Janet Jenkins, 'Editing Distance Teaching Texts', for editors; International Extension College, 'Writing for Distance Education', for writers of any distance-learning materials. A more detailed account of planning educational materials in general is available in Robert Gagné and Leslie Briggs, 'Principles of Instructional Design'.

Another approach is to read accounts of experience; apart from references given in this boook, 'Development Communication Report' is worth reading regularly for information on new activities.

You may also find useful: Lyra Srinivasan, 'Perspectives on Non-formal Adult Learning'.

The different media

Why choose a multi-media approach? - Print - Radio - Television - Films - Cassette tape recorders - Slides and filmstrips - Music, dance and drama - Face-to-face teaching - Group leaders - Culture and media - Summary

In this chapter we consider the different media available for distance teaching. First the arguments for a multi-media approach are discussed, then the characteristics of each different medium are described, so that we can derive criteria for selecting between them.

WHY CHOOSE A MULTI-MEDIA APPROACH?

We can often use one teaching medium on its own and get satisfactory results. Each educational medium can teach equally effectively, if used appropriately. (1) However we are likely to get better results if we combine media. With only one medium, we often have to make greater efforts to treat all aspects of our topic effectively. With more than one medium there is greater choice of teaching methods.

On practical grounds of distribution, a number of media is better than one. An educational project which uses radio alone, for example, can only reach those who are within the range of the transmitter, have a radio set that works, and can listen at the right time. If printed materials and group meetings run parallel to the programme, then more people have access. Those who are unable to listen can still read and discuss.

More important are the effects on learning of combining media. An appropriate mix of media will help compensate for inequalities in the educational background of learners. Illiterate people can understand a radio programme just as well as the literate. Printed support materials for a radio programme provide a permanent record of what has been said, and can present ideas for discussion. It is not necessary for everyone in a listening group to be literate to benefit from such materials; it requires only one literate person

to read the printed materials, and note down group decisions and comments. Similarly, people who are literate but have little formal education or opportunity for reading will be able to read and understand printed materials, but may gain additional understanding if they also listen to a radio programme.

Differences in language background can be catered for in the same way. Radio programmes and printed materials can be produced in different languages - print perhaps being in a country's official language with regional radio stations broadcasting in local languages.

While people can learn equally well from any medium, sometimes one medium is more suitable for teaching a particular topic. For example, a radio programme and a set of pictures used together may be the most efficient means at our disposal for teaching a carpentry technique to a mainly illiterate audience; or an explanatory booklet and a descriptive film together may be suitable for a health education project. Thus two or more media used together can extend and enrich each other and help people understand more easily.

The chances of remembering are often increased with multi-media education. The process of remembering depends on selecting from information received by our senses, and a combination of media will activate several senses. We hear and see the class teacher, television or film; if we have something in print as well we have something we can read and discuss in our own time. We hear radio, while a booklet, a flipchart or a poster on a tree can help us see for ourselves what we have heard. For some restricted aspects of learning, it may be helpful for a learner to concentrate on one sense - listening to words in an unknown language, for example. More often it will help to listen and see, as long as the information conveyed by different media is consistent.

While well-planned use of media helps people to understand and remember better, interpersonal interaction can help long-term memory. An effective way of retaining what we have just learnt is to communicate it to someone else, by writing about it or by discussing it informally or in an organised group. Discussion groups are therefore an important component of multi-media education.

The case for more than one medium is particularly strong where the educator aims to help people to alter their attitudes. We are more likely to persuade people to make changes if we use more than one medium. In the USA in 1943 meat was scarce, and women had to be encouraged to shop for cheaper cuts. One group of women was given a lecture on the subject, while another group had the same lecture followed by group discussion. Far more of the second group than of the first started buying cheaper meat. (2) This result, confirmed by subsequent research, showed that people need more than information to persuade them to make changes. There are generally at least two stages in the process: we get information from one or more sources - radio, television, advertisements, newspapers; we then talk about it with someone else - a friend, a teacher, an extension worker; only then are we likely to decide to adopt or reject a new idea or practice. Broadcasting is particularly efficient for conveying information while discussion stimulates decision-making. But this division of functions is not obligatory: a radio dramatisation, for example, can mirror someone's thought processes so that

he works through the points he might make in discussion with a friend. The important point is that there is an intermediate stage between hearing about something and taking action.

There is often also a substantial time lapse between acquiring information and deciding to use it. People sometimes need to hear about something from several different sources, and work through a number of different arguments before they make up their minds. (3)

Teaching is often easier with more than one medium, as teachers can choose the most suitable medium for each aspect of the subject. A radio series on keeping goats, for example, might include instruction on building a shelter. However, many people would have difficulty in constructing the building from an oral description alone. The radio programme needs the support of a booklet which repeats the instructions in a sequence of words and pictures. The teaching contained in the two media will overlap, but different aspects will come to the fore in each. Different media are best used to reinforce each other; usually one medium does most of the teaching while others supplement this.

Finally, some individuals prefer one mode of learning, some another. Some people, for example, learn well from pictures while for others they have relatively little impact. Instruction that uses several media has a good chance of appealing to such different tastes.

Multi-media education is likely to be more widely distributed, to provide greater equality of access, and to increase learning effectiveness. We consider now in turn first those media that communicate from a distance, then face-to-face communication, including the teacher.

PRINT

We can show things on paper that cannot be explained in words alone. A new concept can be illustrated by a picture, a process can be explained by diagrams, the distinction between points in a list can be made clear where it may be blurred in one's memory of a speech.

Print is also important as an aid to memory. It provides a permanent record of what is being learnt, of the information and of the issues. This could be a summary of a radio programme just heard, a picture as a reminder of a broadcast or a talk, or a full explanatory text.

In addition, people can learn from printed materials at their own pace, going over the material as often as they wish, and moving systematically from one section to the next. Courses can be built up which allow different people to follow their own interests and find their own levels. This is possible even with non-readers provided they work in a group with one literate member.

However, it is hard to learn by reading alone. Although printed materials are generally felt to have considerable authority - most people tend to respect and believe what they read - the written word also tends to be rather impersonal. It lacks the warmth and vigour of the human voice. This, together with other arguments for a multi-media approach, suggests that printed materials are more effective when reinforced with some spoken contact, broadcast or

face-to-face. Face-to-face contact, in a regular group or in occasional meetings with a tutor, encourages feedback and two-way communication between teachers and learners. Such communication can be organised with printed materials alone, by correspondence course assignments, by question sheets in booklets, or by encouraging students to write letters. But replies from teachers are necessarily slow, so some face-to-face support is an important complement to written communication.

Texts take a long time to plan and write but are relatively easy to print. They can be produced on inexpensive and easy-to-handle equipment. For small-scale production the simplest methods of printing are adequate, which open up possibilities for local production of materials for small communities. For large-scale production more complex equipment is necessary, but if numerous copies of each book or pamphlet are produced, the cost per item is low.

Once printed and distributed, materials can only be altered by recalling and reprinting them, or by distributing amendments. Both are undesirable. Sometimes, too, the initial distribution of materials can be difficult and costly, and this can limit the usefulness of print on a large scale. (4)

The most important limitation to print, however, is the fact that many people cannot read. Although printed materials can be used effectively with non-readers, they must only be used with adequate support. Even pictures on their own are often not easily understood by those who cannot read.

RADIO

Radio is the most accessible medium of all. Both readers and non-readers can listen to a radio programme.

Although radio is limited to the spoken word, and cannot demonstrate things visually, it can present an unexpectedly wide range of subject matter. A project in Nicaragua has shown that even mathematics can be taught to primary schoolchildren by radio alone; a teacher is present in the classroom but only as a supervisor, and no printed materials are needed by the children. (5)

Listeners find radio interesting and authoritative, and thus it tends to be a strong force in motivating people to take part in education. In some projects radio is used for this only, to provoke interest or to stimulate learners to keep going. Regular programmes also pace people's learning. This may help them to keep going, but sometimes it may discourage those who drop behind.

Radio is also seen as friendly and personal. Listeners can identify more with a voice over the radio than with the writer of a book. They can get to know and understand people through radio interviews, they can grasp problems through listening to radio dramas, and they can listen to their questions answered in discussion programmes.

This feeling of personal involvement stimulates people to write to radio programmes. Broadcasting has a strong advantage over print here, since programmes can be designed to react to audience response. There is no need to finalise the content well in advance of transmission. In addition, audience response does not have to

be by letter. Radio producers can devote a proportion of programme time to recordings of members of the audience. If listeners have cassette tape recorders, they can record and send in their own contributions.

In a multi-media programme radio may be chosen for less formal, community-based aspects of the curriculum. For, although radio can be used effectively for straightforward teaching, it has the disadvantage that it is impermanent. If you miss a programme, or fail to understand a point, you have lost it. In addition it is difficult to take notes while listening. If print is linked with radio, the two together work very well. The Latin American radio schools use this combination to teach adults the equivalent of the entire primary school curriculum, and more. However these schools often operate through private radio stations and have access to a large amount of air time. In most other cases, time is limited and is therefore better used in concentrating on those areas print can deal with less well.

The availability of suitable transmission times is one of several practical problems in using radio for education. Often, even if a programme is broadcast two or three times, it is difficult to get a time which is convenient for all potential listeners. Moreover, radio reception is often poor or intermittent even in areas which transmitters are meant to cover. Ownership of radios, too, is still patchy in many countries; it tends to be concentrated around cities. In rural India, for example, there is only one set to every 500 people. (6) Many who have radios may not be able to get spare parts easily, or even new batteries.

But these problems should not be allowed to overshadow the supremacy of radio in offering access to education to people everywhere. It can reach people where they choose, in their homes or in community groups. And it can do so at considerably less cost than its rival, television. (7)

TELEVISION

Most of the points made about radio apply to television too, with differences that arise from the fact that television has a picture. Even people who are not used to seeing the world represented in black and white in two dimensions very quickly get used to the moving pictures on the screen. (8) Television can present things that are difficult to show in print or describe on radio. For example, television in teacher training can give practical demonstrations of the handling of classroom situations. (9)

There are some ways in which television is more difficult to learn from than radio. It is extremely hard to take notes while listening and watching. It can also be more difficult to react creatively, as one's mind is occupied with sound and picture. One art course for American children was more successful on radio than on television; while following the radio programmes children tended to produce imaginative pictures whereas with television they tended to imitate what they had seen on the screen. (10)

These differences between the broadcast media are slight. The major difference is that of cost. Making programmes is costly.

In 1977 British Open University television programmes cost ten times as much as radio programmes. (11) A similar difference has been recorded between educational television and radio in Mauritius. (12) Even if programming costs are cut to a minimum, television is still several times more expensive than radio. (13)

Linked with cost are access and transmission. Many people cannot afford television sets, even if they could use them. But in order to receive signals, there must be a power supply and a transmission network, both expensive to establish. Television signals require more relay stations than radio. Videotape recorders give the potential for field programmes and feedback that sound recorders give for radio, but this can hardly be realised without a developed transmission system. Meanwhile costs rise. As manufacturers in richer countries phase out large-scale production of black and white television equipment, so the costs of introducing or extending black and white television are getting higher, while the costs of colour television systems are higher still.

Where television is widely available, the argument for choosing between television and radio for education is not a simple one. While the rational choice would be for radio, as it costs less, and does much the same things, television attracts large audiences away from radio.

FILMS

Films do without transmission networks and receivers but must be taken to the audience. Where power supplies are lacking, vans can do this very effectively. In 1976 in Kenya, for example, only 12 vans showed films to an average monthly audience of 840,600 people, with an audience at each show of between 2,000 and 3,000. (14) The presence of people showing the film has advantages. If a commentary is in the wrong language it can be turned down and the projectionist can read out a commentary in the local language. (15) It is also possible, as people are already gathered together, to organise discussion groups after the show, or to distribute supporting printed materials - much more difficult to do with the scattered audiences for broadcasts.

CASSETTE TAPE RECORDERS

As reduced cost makes sound cassette recorders more accessible, they are being more widely used in nonformal adult education. Videotape recorders are sometimes also used, but are usually still too costly.

Where work is on a small scale, sound recorders are excellent for presenting material that might otherwise be broadcast. There are no reception problems and maintenance of equipment is easy to control. Portable recorders can also help decentralise broadcasting. It is easy for anyone to learn how to make a recording. Since 1972 Radio Mensaje, a small radio school in Ecuador, has been using materials recorded in village groups to make up programmes. These have become so popular that the amount of time devoted to these programmes each week has tripled. (16)

For learning, cassette recorders differ from radio in that you can wind back the tape and listen again to bits, or the whole programme, and there are no restrictions on the time when you listen. In Guatemala, for example, tapes about health are played regularly in the communal washhouses and women listen as often as they like and discuss the ideas informally. (17)

Cassette recorders can provide localised services to small communities and can be used for relevant feedback. They can also be used as a supplement to radio where reception is poor. Trainee teachers in remote areas of Tanzania, for example, receive tape recordings of programmes broadcast directly to others. (18)

The main problems with using cassettes on a large scale are those of distribution and costs, in making copies of tapes, delivering them, and providing equipment for playing them. Where projects which could benefit from radio support are on a small scale, cassettes may well be cheaper; on a large scale they are not cheaper, but could be used selectively to give programme content a more lively and varied feedback element.

SLIDES AND FILMSTRIPS

Transparencies may be used to accompany talks, print, radio or sound tapes. In a few cases they are used as the main medium of instruction. A scheme in Rwanda, L'université radiophonique de Gitarama, (19) was started in 1964 to try to improve the primary school curriculum and make it more relevant to the agricultural future of the children. Slides are used in classes as the basis of the courses, not an accompaniment. They are all made locally in black and white or in colour and contain pictures or words. Sets are loaned to schools and the contents of a set or the words on a particular slide can be easily altered on its return to the centre. Very few slides are lost or damaged, so that annual replacements are small, and each slide normally lasts several years. Sets are used either with a taped commentary or lesson notes, with printed guidelines for teachers. Classes use manual projectors. A tape recorder is needed for French language only.

The system is cheap. For the cost of an average textbook you can make 55 black and white slides or 28 colour slides which will serve over 400 children and last at least 10 years.

To work well, this sort of scheme needs a suitable organisational framework, probably small-scale, so that slides or filmstrips can be used again and again, and group study, to avoid the costs of producing numerous sets or strips. If, however, transparencies are for individual use, a handviewer or just the human eye is sufficient.

Sets of slides can be made up from a stock to fit specialist needs in different countries or regions. A London organisation, TALC (Teaching aids at low cost), produces slides for training health workers at all levels and distributes them throughout the world. There are at present about thirty sets available, together with lecture notes, but the number is expanding, and each set is adapted to the needs of different countries. (20)

Cheap to make, reusable, easily changed, easily combined with

print or sound, transparencies deserve greater use in nonformal education. (21)

MUSIC, DANCE AND DRAMA

Music, poetry, dance and theatre are traditional media through which people express their ideas and feelings. Each culture has its own traditional forms. There has recently been a surge of interest in using such art forms for nonformal education. Drama in West Africa and amongst Mexicans, festivals in India, puppets for family-planning education in South-East Asia are a few examples. (22) Such entertainments allow a lively, dialectical representation of important issues which stimulates audience reactions. They encourage spontaneous self-expression amongst both participants and audience, which can help us clarify or change our opinions, and they reflect local traditions and culture. Since they are in a familiar style, they rapidly stimulate discussion on the content rather than on the form.

If people enjoy gathering to watch a play or listen to a story-teller, they will do so with pleasure even if the entertainment presents new, perhaps unwelcome, ideas; if educators can weave the ideas into the accepted stylistic conventions of the art form, then they will be more easily understood. A survey in Ghana found that a number of people who watched educational 'concert party' plays about family planning changed their attitudes to the subject and some started practising birth control. The same survey found that, for rural people, plays were their most important source of information on the subject; urban people put radio first on their list but still rated plays highly. (23)

Live entertainments, like films, get people together, and are therefore helpful in encouraging participation in community development. They can attract a large proportion of the population of any one district. Local references can be easily included in a performance, and local people can join in informally.

There are two ways of including such media in a distance-learning programme. First, a touring company can create or maintain interest in a project. Second, we can use the forms of live entertainment in other media and thus make them available to a much wider audience. A Nigerian family-planning film, 'My Brother's Children', is in the style of a traditional play. In Latin America the popular 'soap opera' format is used for education on both television and radio. (24) In Tanzania, old people who were formerly itinerant story-tellers are recording their tales which are then written down, partly for historical value, but also, importantly, to provide reading material for people who are newly literate. (25) In such cases the entertainments cannot be spontaneously adapted to local needs.

FACE-TO-FACE TEACHING

One of the major reasons for using distance teaching is lack of a teacher, due to a shortage of trained teachers or to the novelty of

the approach or the subject matter. A teacher or leader within distance teaching is likely to have different functions from the conventional teacher.

Why is a teacher needed at all? In nonformal adult education the learners are always mature and experienced people, and can often manage to study without a trained teacher. But face-to-face support of some kind is generally desirable. It is extremely difficult to decide on and organise the right sort of support, especially when costs are an important consideration.

A study group using printed materials or radio could be organised in several ways. It could have a trained teacher or professional present all the time; it could have the support of a paraprofessional worker; or it could work alone, with a leader chosen from the group, often given a minimal training, and with access to professional advice when necessary. The latter is the most economical both in costs and in manpower, and is the system used all over Latin America in radio schools.

There are certain advantages in having an extension worker, a health worker or a primary teacher as a leader. There is immediate two-way communication between teachers and learners; the teacher can demonstrate things to the group, and can respond immediately to questions. But if you analyse lessons closely, you will find that there is often little that could not be explained if the teacher was not there. (26) The teacher can control the progress of a lesson, and the learners too can control what the teacher does. But there are difficulties here. Practising school teachers often find it difficult to allow a group to be democratic, to treat adults as adults and not as schoolchildren. (27) The learners too find it difficult to break across the mental barrier which tells them that teachers are authority figures to be respected. (28) Non-professionals sometimes make better leaders. Radio Santa Maria, the radio school in the Dominican Republic, has study groups with monitors. They have found that young primary graduates, usually involved in community work, often make better monitors than do trained teachers. (29)

A teacher needs to be retrained to work in distance education, for her role is different. The burden of teaching is taken away from her and she becomes a guide. Her skill can thus be spread to help more people effectively and to use her time more economically.

GROUP LEADERS

A group leader must be selected as soon as a study group is proposed or formed, for he generally needs some initial training in order to be effective. If a group is asked to nominate a leader, it is more likely to be a suitable person than one who volunteers or one who is chosen by outsiders. Not everyone who is keen to help is suitable. In some communities a young primary school leaver may have the right educational background to lead a group but he may not have the status that makes him acceptable to others. (30) In other cases a volunteer leader may not have sufficient local contacts. Some leaders of radio school groups in Colombia, for example, have few contacts within the community and so are not very influential or effective. (31)

CULTURE AND MEDIA

While we choose particular media because they are suitable for the subject taught and accessible to learners, local culture also matters. The best starting point for learning is the familiar. Popular traditional forms of drama, art or literature are therefore important for education. One medium may be better adapted to such forms than another; for example, radio might in some cases be a better medium than print for an educational story in traditional style.

One medium may be more in harmony than another with traditional informal methods of education. In some cultures, to learn practical skills you follow a demonstration with verbal instructions and explanations; in others, words are scarcely used and all is learnt through action. If you come from a culture where the second method is the norm, you will be more likely to learn new skills at a distance if the presentation is primarily visual. We should therefore use our knowledge of culture to help us choose between media. (32)

SUMMARY

Our discussion of the various media used in nonformal education will help us choose between them, but does not give a formula for universal use. For in each case we have to take into account the way people live locally, their social structures and values, and their environment. We also have to consider practical and financial constraints. There is no easy way to make choices.

However there are several basic questions to be answered, which narrow the range of possibilities. The first set is about access: is this medium a practical possibility? Do people have access to the medium? Do organisers have access to the trained manpower that will make the use of that medium possible? Second, is it sensible in terms of costs? Third, will it have the desired effect? Is a particular medium suitable for helping us reach our objectives?

Beyond these questions come more difficult ones about using and mixing the media and face-to-face teaching in the best way. Much of the rest of this book faces these questions. Each chapter takes a different medium or topic and offers practical guidance on its use.

BACKGROUND READING

A great deal has been written on communication and media for nonformal education. Mentioned below are three recent and useful collections of papers: Godwin C. Chu, Syed A. Rahim and D. Lawrence Kincaid (eds), 'Communication for Group Transformation in Development'; Wilbur Schramm and Daniel Lerner (eds), 'Communication and Change: the Last Ten Years - and the Next'; W.P. Davison and F.T.C. Yu (eds), 'Mass Communications Research, Major Issues and Future Directions'.

For those who require an extended study, there is: Everett M. Rogers and Floyd F. Shoemaker, 'Communication of Innovations: a Cross-cultural Approach'.

On media for education the best study is: J.M. Trenaman, 'Communication and Comprehension'.

A stimulating article, chiefly about print, is: Richard Hooper, Education and the Mass Media.

For a broad comparative approach, see: Wilbur Schramm, 'Big Media, Little Media'.

Finally a different approach for those who would like some down-to-earth assistance with acquiring skills in communication for distance education: D. Lawrence Kincaid with Wilbur Schramm, 'Fundamental Human Communication'. This consists of a self-instructional text, manager's guide and case study. The case study is of a family-planning project.

Chapter 7

Writing simply

Writing simply in English - Questions of style - Testing for comprehension - Writing simply in other languages - Simple style for other cultures - Translation - Bilingual texts - Summary

All educational materials should be written simply, in a style that is straightforward and uncomplicated, reflecting the natural flow of coherent speech. It is likely that you will communicate clearly if you take these three steps:

1 Be clear what you want to say. The planning of the objectives and the content of materials should bring you to this point.
2 Say it clearly, choosing carefully the way you say it.
3 Test it, to check whether others understand you.

Careful planning helps clear writing. Muddled prose is often simply the result of muddled thinking; however, passages that are simple to understand tend to share a number of stylistic features.

WRITING SIMPLY IN ENGLISH

Where English is used for distance teaching, it will frequently be the learners' second language. The points in sections 1 and 2 apply for all texts in English, but must be given particularly serious consideration for second-language readers.

1 Sentence structures

(a) Sentences should be short. Twenty words is quite long enough for any second-language learner, and too long for adult learners with little reading experience. Even after several years of formal education in English as a second language, people often have difficulty in understanding long sentences.
(b) Sentences should be simple in content. There should only be one idea in each sentence.
(c) Sentences should have a simple structure. This should be easy

to achieve if sentences are kept short. A sentence seldom needs to contain more than two clauses. It can consist of two co-ordinate clauses or one main clause and one dependent clause.

The arrangement of clauses is also important. The logical order of events needs to be reflected in the order of the words. For example, I could write:

'Before I could answer the phone, it stopped ringing.'

The phrase that dominates this sentence is 'answer the phone'; but this is precisely what I did not do. The sentence is potentially misleading. A much better order would be:

'The phone stopped ringing before I could answer it.'

Confusion is also caused by 'embedded' clauses, where the meaning of a dependent clause is tucked inside the main clause. Compare the following sentences:

'Alexander Bell invented the telephone.'

'The man who invented the telephone was called Alexander Bell.'

'The man who invented the telephone which enables people to talk to each other over long distances was Alexander Bell.'

The first sentence needs no comment. The second distributes the important information in the sentence in two parts. The name of the inventor stands out while the thing he invented is unnecessarily buried. This sentence, however, is still reasonably clear. In the third sentence the meaning is obscured by the embedded clause describing the telephone. This sentence needs to be broken up as it contains two separate ideas. (1)

Clauses beginning with relative pronouns - 'who, which, that', and so on - and those indicating time or place, such as those starting with 'when, where, after, before' are relatively easy to understand.

(d) Sentences should be positive and direct. Sentences that make positive statements are easier to understand than those in the negative. Most negative statements, like the ones below, can easily be rearranged as positive ones:

'Do not plant if the ground is not wet.'

'Do not plant until it rains.'

'Never plant in the dry weather.'

There are some other ways in which sentences can contain implied negatives. The words 'unless' and 'although' often indicate the presence of a negative and are better replaced by 'if' or 'because'. The word 'less' has similar implications, and sentences containing it should be turned round to use 'more' instead.

This does not mean that we should avoid all negatives, but we should attempt to eliminate unnecessary ones. Occasionally a negative word is more effective; prohibitions in case of danger can stand out more clearly in negative form: 'Danger - deep water - no swimming.'

The use of passive and impersonal structures can also make sentences indirect. In an impersonal structure, the verb is preceded by a general 'it'; in a passive sentence, the subject of the sentence 'suffers' the action of the verb, when something is done to, not by, the subject. The following sentence contains both an impersonal structure and a passive verb:

'It should be realised that seeds should be planted in wet weather.'

Its meaning is simply, 'Plant seeds in wet weather.'

How much do these details matter? A sentence which is indirect or too complex in any one of the ways described will take any reader - whatever his competence in reading or in the language - a little longer to understand than simple sentences with similar meanings. If sentences are consistently indirect or difficult, reading will be significantly slower, attention will start to wander, the thread of arguments will be lost. (2)

Sometimes unusual or advanced structures are unavoidable. If you need to use them, you must teach them. Some types of subject matter require certain structures. If you present historical matter, for example, you may find that you need to use some verb tenses that are rarely used in everyday speech, and you will need to make sure learners understand and can readily handle concepts of time. (3)

2 Longer passages of prose

(a) A paragraph should grow logically. The key sentence, expressing the main idea, should be at the beginning. The ideas need to be presented in a logical order. If a paragraph covers more than half a page of typescript, it has probably wandered from the point. In very simple texts for poor or inexperienced readers, paragraphs should be of four or five lines only.

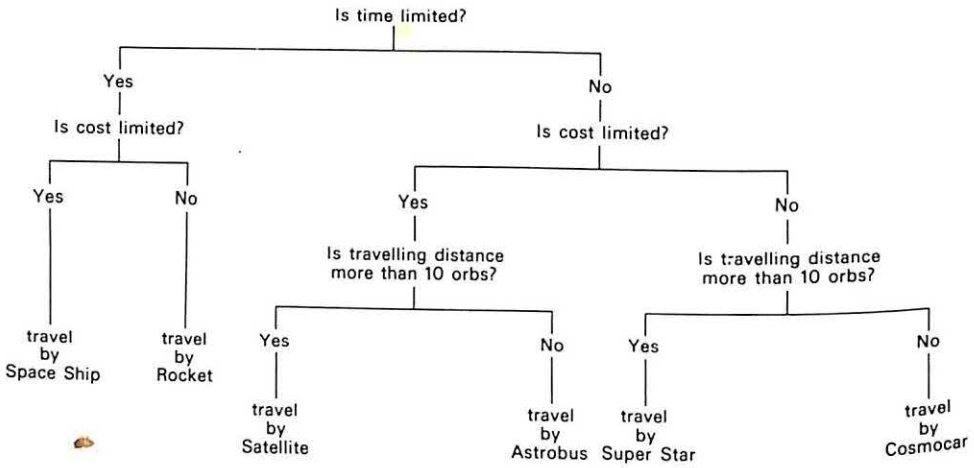
(b) Consider alternatives to continuous prose. There is no need to stick to formal sentences or paragraphs. If a number of points relate to the same idea it is often helpful to set them out in a list. If relevant information has to be selected from several possibilities, then we should make the different paths visible in our presentation. This can be done with charts or tables. There are three advantages of such a presentation: (4)

1 The reader makes explicit decisions. The format helps him eliminate unnecessary factors.
2 He makes only the minimum necessary decisions. The format pre-selects the relevant factors.
3 He does not have to remember previous decisions. The pathway from one decision to the next is marked out.

Such methods of presentation can therefore be useful if learners must make decisions or select relevant information. There are a number of ways we can present information - a table, short sentences in a list, a flow chart, or a logic tree. There is no best method amongst these: each needs to be selected to fit the context, as the experiment described below explains.

Some people were asked to pretend to be employees dealing with customers in an imaginary space travel agency. Each 'employee' had information available in one of the formats shown in Figure 7.1 and he had to deal with both difficult and helpful customers. It turned out that where the customers were helpful and travel problems simple, the table was the quickest and easiest method for extracting information; where the customers were awkward, the logic-tree users gave the most accurate information. The continuous prose version gave the worst results, while the short sentences were quicker to use than the logic tree, but slower than the table. (5)

Related research into the presentation of government forms and



FLOWCHART - LOGICAL TREE

The Prose passage was intended to approximate the traditional bureaucratic style and read as follows:

When time is limited, travel by Rocket, unless cost is also limited, in which case go by Space Ship. When only cost is limited an Astrobus should be used for journeys of less than 10 orbs, and a Satellite for longer journeys. Cosmocars are recommended, when there are no constraints on time or cost, unless the distance to be travelled exceeds 10 orbs. For journeys longer than 10 orbs, when time and cost are not important, journeys should be made by Super Star.

PROSE

The list of short sentences was set out as follows:

Where only time is limited
travel by rocket.

Where only cost is limited
travel by satellite if journey more than 10 orbs.
travel by astrobus if journey less than 10 orbs.

Where both time and cost are limited
travel by space ship.

Where time and cost are not limited
travel by super star if journey more than 10 orbs.
travel by cosmocar if journey less than 10 orbs.

SENTENCES

	If journey less than 10 orbs	If journey more than 10 orbs
Where only time is limited	travel by Rocket	travel by Rocket
Where only cost is limited	travel by Astrobus	travel by Satellite
Where time and cost are not limited	travel by Cosmocar	travel by Super Star
Where both time and cost are limited	travel by Space Ship	travel by Space Ship

TABLE

FIGURE 7.1 The formats used in the 'travel agency' experiment

leaflets in Britain has shown that charts or tables are often easier to follow than continuous prose, provided thorough instructions are given to readers. They should, however, be used with caution with people who cannot read well, who may find the combination of an unusual form of presentation and a set of written instructions too difficult. And if readers must retain as well as understand items in a list or table, they will need the help of exercises.

3 Vocabulary

Whatever subject we are teaching, we should attempt to use words which are in common use or familiar examples to illustrate and explain. The following guidelines will help in the choice of vocabulary.

(a) Use concrete words in preference to abstract ones. 'Concrete' words denote objects or people: baby, king, friend, thief. 'Abstract' words denote ideas: infancy, monarchy, friendship, dishonesty. Concrete words are more quickly understood.

(b) Long words are likely to be difficult. Check on any words that are over three syllables long, using one of the word lists or dictionaries of basic English, such as Michael West's lists ranging between 500 and 2,000 words. His 2,000-word list is a good reference for most texts. (6)

Not all long words are necessarily difficult. Adults who read poorly can often identify words of several syllables using the syllables and context as clues. They may have greater difficulty with short, unremarkable words. Common sense, a word list and tests of materials will help you identify such words. (7)

(c) Topics important to a culture have a large and precise vocabulary. Often, a large vocabulary is attached to traditional sources of livelihood. For example, the Somali language has many different words for kinds and states of camels, all in normal use but with precise meanings. Another example is kinship; where a particular relationship has social importance, there will be a word to express it. In English, we do not have single words for mother's sister's son or mother's brother's daughter; we call them both cousins. In British society, the distinction is not important. In many languages words for these and similar family relationships are in daily use since such relationships matter to the society.

Vocabulary problems sometimes lead to the conclusion that certain topics can only be discussed in the local language. If this language is unwritten, we may have to teach without written materials using, perhaps, radio and pictures.

(d) Specialist or unusual words may be needed to teach concepts unfamiliar to the culture. Before introducing such a word, there are two questions to ask. First, is that word really necessary? Perhaps there is a common phrase that could be used instead. Second, if a word is uncommon, is there some good reason why? Is it an acceptable word? In family-planning education, for example, some English words have unacceptable equivalents in local languages. (8) Occasionally, also, an English word with a perfectly ordinary meaning can sound similar to an offensive word in a local language, and so be inadmissible.

If you do introduce unfamiliar vocabulary you must make sure that your use of it is consistent. Sometimes technical terms are introduced and explained, and the author then reverts to using circumlocutions, or alternative terms that have not been explained. (9) This is confusing, and suggests incidentally that the term was not necessary in the first place.

You must also teach the use of new words. A new term must be explained, with examples that relate to the learners' experience. A picture may often help. When writing in the learners' second language you may be able to provide a translation into their first language. Also, try to help learners to pronounce the word. If they have no opportunity to hear the word spoken they can compare it with the sound of words and syllables they know. Finally, provide exercises of some kind that will encourage learners to use the word immediately and so learn it thoroughly. Figure 7.2, from a correspondence course in biology used in Lesotho, shows how three technical terms were introduced and explained, with two exercises to support the teaching.

(e) Be generally consistent in the use of vocabulary. Call a house a house, and not a cottage or dwelling. Call a field a field and not a meadow or pasture - unless corresponding distinctions are made in the local language and need to be reflected. Many similar examples are easy to find, since English is rich in words with similar meanings, even at basic level. There is no point in varying vocabulary unnecessarily.

4 Using metaphors

Some images that are common in one country are obviously unsuitable in others; 'as white as snow', for example, is not helpful to people in a country where snow is unknown. In other phrases the meaning of the original comparison is lost. We might talk about a child being 'as good as gold' or 'as happy as a sandboy', without having any idea why 'gold' or what a sandboy is. This does not matter amongst English people; they will understand. But the image would be quite confusing to a foreigner.

Metaphors are widely used in English. These often suggest pictures which are not appropriate to the culture in which we are working. Here are some examples from a geography textbook for English children: (10)

'Long ranges of mountains sweep all the way down the west coast.'

'The curves of the folded ranges outline on the map, at a respectful distance, the ancient shields.'

'The blanket of steam-clouds had become very tattered and thin.'

These metaphors are hardly extravagant for an English audience, but they could cause difficulty for second language readers. Mountains sweeping, ranges being respectful? Unfortunately textbooks or other learning materials in English for use in countries other than England abound in metaphors of this kind, often more grossly inappropriate than those quoted.

DO THIS NOW

Now I want you to take the flower which you found for this lesson and carefully cut down the middle of the flower with a razor blade.

So the half of your flower should look something like this.

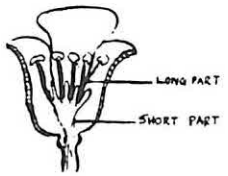


DIAGRAM 2:

You will use it to study more of the anatomy of flowers.

THE MALE PART

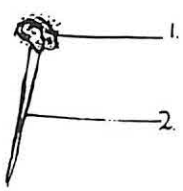


DIAGRAM 3: _____

Look at your flower. Do you see the long parts on the outside. These are stamens. A flower has usually many stamens. The stamens are the male part of the flower.

Pull out a stamen from the flower and look at it. You will see that the fat part at the top is yellow. The yellow colour is pollen. The fat part at the top of the stamen is the anther and it contains tiny sacs of pollen. The long, thin part of the stamen is called the filament and it supports the anther in the flower.

Now label diagram 3. 1 - anther
2 - filament
title - The Stamen

And answer these questions.

1. What is the name of the male part of the flower? _____ stamen

2. What colour is the anther, and what does it hold?

_____ yellow, pollen sacs

3. Which part of the stamen supports the anther? _____ filament

FIGURE 7.2 New words explained and learnt in a biology text from Lesotho (reduced from A4 original)

5 English phrasal verbs

It is very common in English to use compound verbs of a kind known as phrasal verbs. A phrasal verb consists of a simple verb word followed by one or more prepositions or adverbs. The group of words forms a verb phrase with a meaning of its own. Consider 'take after', 'take in', 'take off' and 'take to' in the following sentences:

She took after her mother.
The dress needed taking in.
He took him in with his disguise.
The plane took off.
The actor took off the politician.
I took to him immediately.

The verb 'take off' has two meanings, each of which seems to have nothing to do with the simple verb 'take'. It would not be possible to guess the meaning of any of these phrasal verbs from the two individual component words.

The use of phrasal verbs is difficult to grasp for two main reasons. First, it is often hard to tell whether a word is indeed a phrasal particle going with a preceding verb, or simply a preposition with a following noun. Consider these two sentences:

She ran out of sugar.
She ran out of the shop.

We have to divide them differently to show the difference between their apparently simple structures:

She ran out of/sugar.
She ran/out of the shop.

Second, a word used thus with a verb may have a different meaning from the same word used as a preposition. 'Up', for instance, when used with verbs frequently means 'completely':

Finish up the food.
The steam dried up.

'Out' frequently implies extinction:

He put out the fire.
We ran out of paper.

It is advisable to use phrasal verbs sparingly, and test materials to discover whether they are understood.

QUESTIONS OF STYLE

A conventional teaching text consists of examples, followed by explanation of general points, followed by questions. An examination of traditional styles of transmitting information may suggest other approaches, more attractive and familiar to our learners.

In many places history is passed from generation to generation in poems. There are traditions of epic or other oral poetry in many parts of the world. In parts of South India, for example, any notable event will be celebrated in song. (11) In Lesotho all history is traditionally told in poetry, and the bulk of traditional poetry is history. (12) These forms of poetry will have distinctive styles which it may be possible to adapt for education. (There is need for caution here; the language of Lesotho poetry, for example, is extremely archaic.)

Moral issues are often debated and taught in drama, through proverbs, or through fables, often based on animals. E.S. Bowen, an anthropologist writing a personal account of her experience in Nigeria, describes how she hired a young local man who could read and write to assist her with her work. She would ask him to explain events she did not understand fully. Instead of answering her directly, he would compose a fable in the local style to explain the matter. She comments: (13)

> I had grown used to their mode of exposition, though I could not yet follow it: first they give the conclusion, then the minor premise. The major one is then supposedly obvious; to ask for it merely proves one isn't of normal intelligence.

There existed a standard mode of instruction, with a set way of presenting information.

Different traditional styles of debate also exist, such as the style of legal arguments used in Liberia, which prefers points to be made indirectly. (14) Any such traditional oral or literary styles could be used and adapted for nonformal education.

TESTING FOR COMPREHENSION

Any of the following simple methods can be used to discover whether a text is easy to read.

1 Testing for sense. Read the text out loud. You can do this yourself or get someone else to read it to you. You will immediately discover where the prose is halting or ambiguous. When you come to rewrite sentences, it is usually easier to rethink and rewrite paragraphs as a whole. Sometimes changing one or two words clarifies a sentence, but often small changes can produce a stilted effect.

2 Testing for level without a sample of readers available. There are a number of ways of doing this, which are based on the fact that long words and long sentences reduce readability. One method, the Modified Fog Index, is applied as follows: (15)

1. Select a 100 word sample from the text.
2. Work out the average length of complete sentences in the 100 word sample.
3. Count the number of difficult words. A difficult word is defined as one containing three or more syllables.
4. Calculate the formula:

$$\frac{(ASL + DW) \times 2}{5} + 5$$

[where ASL equals 'average sentence length' and DW is 'total number of difficult words'].

Your score will be somewhere between 8 and 30. The lower scores are matched to the age of English school children. Think of the score as an index of difficulty. Anything over 12 will be quite difficult for non-English adults with no more than primary education, while over 20 is difficult for anyone. You need to repeat this test with three or four samples of text.

Here, as an example, is the opening of H.G. Wells's 'The Time Machine' scored for readability:

THE TIME MACHINE

The Time Traveller (for so it will be convenient to speak of him) was expounding a recondite matter to us. His grey eyes shone and twinkled, and his usually pale face was flushed and animated. The fire burned brightly, and the soft radiance of the incandescent lights in the lilies of silver caught the bubbles that flashed and passed in our glasses. Our chairs, being his patents, embraced and caressed us rather than submitted to be sat upon, and there was that luxurious after-dinner atmosphere when thought runs gracefully free of the trammels of precision. And he put it* to us in this way - marking the points with a lean forefinger - as we sat and lazily admired his earnestness over this new paradox (as we thought it) and his fecundity.

'You must follow me carefully. I shall have to controvert one or two ideas that are almost universally accepted. The geometry, for instance, they taught you at school is founded on a misconception.'

Excluding the title, the hundredth word is 'it' (marked *). The hyphenated word 'after-dinner' is counted as two words. Four complete sentences precede 'it', of 20, 15, 27 and 34 words respectively. This gives an average sentence length of 24. There are 13 words of three or more syllables, including the beginning of the fifth sentence. These are underlined. So our formula becomes:

$$\frac{(24 + 13) \times 2}{5} + 5$$

which results in a score of 19.8. The passage is therefore verging on the difficult for any reader, and certainly difficult for a second-language reader.

3 Testing for level with a sample of readers. The best method is the Cloze test. (16) This test is easy to administer. Select one or more sample passages of 200-250 words (choose passages containing few proper names). Type or write out the passage leaving out every eighth word (or tenth word if you prefer). If the passage is in the mother tongue of the reader leave out every fifth word. Give the passage a title and leave intact the first and last sentence.

Part of H.G. Wells's passage is printed below, prepared for a Cloze test for English readers: (17)

THE TIME MACHINE

The Time Traveller (for so it will be convenient to speak of him) was expounding a recondite matter to us. His eyes shone _____ twinkled, and his usually _____ face was flushed and _____. The fire burned brightly, _____ the soft radiance of _____ incandescent lights in the _____ of silver caught the _____ that flashed and passed _____ our glasses. Our chairs, _____ his patents, embraced and _____ us rather than submitted _____ be sat upon, and _____ was that luxurious after- _____ atmosphere when thought runs _____ free of the trammels _____ precision. And he put _____ to us in this _____ - marking the points with _____ lean forefinger - as we _____ and lazily admired his _____ over this new paradox (_____ we thought it) and _____ fecundity.

'You must follow _____ carefully. I shall have _____ controvert one or two _____ that are almost universally _____. The geometry, for instance, _____ taught you at school _____ founded on a misconception.'

'_____ not that rather a _____ thing to expect us _____ begin upon?' said Filby, _____ argumentative person with red _____.

'I do not mean _____ ask you to accept _____ without reasonable ground for _____. You will soon admit _____ much as I need _____ you. You know of _____ that a mathematical line, _____ line of thickness nil, _____ no real existence. They _____ you that? Neither has _____ mathematical plane. These things are mere abstractions.'

Now ask a test group of learners to fill in the words they think should go in the spaces. There is no need for a time limit for this. When they have finished ask them to count the words they have guessed right. (Synonyms can be counted right or wrong, as long as you are consistent.)

Take each total of correct words and turn it into a percentage. If the score is between 50 per cent and 100 per cent, then the reader can understand the passage reasonably well. If it is between 35 per cent and 50 per cent then he will be able to understand the complete passage with the aid of a certain amount of instruction. A score under 35 per cent is a 'frustration' score - the reader would be unable to grasp the pattern of meaning of the passage, though he might understand some bits. A text for distance teaching should achieve a score of at least 50 per cent, with 70 per cent being a safer minimum. (These scores do not relate to any external standard of readability. They give you a rough measure of whether the average reader will understand the text well. If several of your test group score around or below 50 per cent, then you can be sure the text needs simplification.)

Any of these techniques help us check whether a text can be easily read and understood, but they do not tell us whether people are likely to learn from the text. Will they be able to connect together different points and follow sets of instructions?

The Lesotho Distance Teaching Centre is developing techniques for assessing how effectively people are likely to learn from printed booklets, and recently tested three different pamphlets on family planning. (18) The booklets were written in Sesotho, but the testing techniques can be used with any language. Two were 'photostrips', booklets with a photograph and a small amount of text on each page; the third was mainly words with some photographs. The testers wanted to answer three questions. Did readers see that the stories were relevant to them personally? Could they see important connections between different parts of the stories? Did they remember the stories for long?

In order to answer these questions, each booklet was tested in a different way. The first one, 'Thabo's Homecoming', described a man, Thabo, returning from the mines in South Africa, worried because his wife has told him she does not want to become pregnant for her own and her children's health. His travelling companion tells him about contraceptives, they discuss Thabo's fears on the subject, and he decides to visit the clinic and find out more.

To find out whether they might be similarly motivated by the story, readers were asked questions like:

'Do you think that Thabo spoke to his wife after the story?'

'What would you have done if you were in Thabo's place?'

If a reader answered by supporting family planning or entering into

argument about it, the researchers concluded that he had seen in the story some relevance to his own life. If his response was non-committal, then the assumption was the story had no effect. In fact, all the men who understood the story well responded in a lively way to the questions.

The second pamphlet, 'Matseliso's Wedding', was a photostrip story aimed at older women, introducing the idea of child spacing. It told of a woman who wished to stop child-bearing now her eldest daughter was to be married. This time the story was quite complicated, and the researchers questioned readers to discover whether they could connect together different aspects of it: (19)

> To answer this question correctly the respondent has to demonstrate a level of comprehension higher than that of 'literal' comprehension. Whereas literal comprehension does not go beyond the understanding of the parts of the story, this question tests an understanding of the part in relation to the whole.

Although many of the women interviewed could only read with difficulty, about two-thirds of them answered correctly.

The third pamphlet was on weaning, child-spacing and family planning for young married women. It contained a dialogue between a nurse and a young mother. This time the researchers wanted to find out whether readers still remembered what they had read some time later. The pamphlet was given without comment to a number of women. Three weeks later they and a number of others who had not read the pamphlet were asked factual questions on topics from the booklet, such as 'Have you heard of the contraceptive pill?' There was a clear difference between the two groups, and it was evident that those who had read the pamphlet had done so carefully and learnt from it.

The Lesotho Distance Teaching Centre therefore established for the first booklet that readers took it seriously, for the second that they understood the development of the story and, for the third, that they retained what they had read. The research techniques used were simple and efficient, and a useful complement to readability tests. A further important method of testing new materials is practical trials, to see if instructions can be followed. Selective use of each of these methods of testing will establish whether readers understand texts thoroughly.

WRITING SIMPLY IN OTHER LANGUAGES

To some extent, the same guidelines as for English apply. Simple vocabulary and simple grammatical structures should be used. With many non-European languages, however, it may be difficult to write short sentences and use short words. There are three major problems to consider. First, many languages are highly inflected. A noun, adjective or verb may have a variety of endings or beginnings, each one correct only for a specific person, number, gender or tense. Poor readers may have difficulty recognising the many forms. Second, the order of words may depend on the grammatical structure of the sentence, and may by convention be different in writing from speech. Third, a single word, especially a verb, may gather into it a number of particles, each of which has a particular meaning, but is actually written as part of the main word. For

example, in an African language of the Bantu group such as Swahili, a basic verb stem might have only one or two syllables. But it can easily have added to it elements which indicate the person speaking, the person being spoken to, the object spoken about, the time the action takes place, and the mood of the verb. An example is the Swahili word 'anakupenda', 'he (or she) loves you'. (20) Marian Halvorson, a literacy worker, points out that the only stable element in the word is 'pend', the stem meaning 'love'. Each of the other syllables could be replaced by between 8 and 30 variants, as below:

a	na	ku	pend	a
27	8	10		30

Each of these would give the verb a different meaning. Some possibilities are:

anavyokupenda (how she loves you)
atakavyokupenda (how she will love you)

All verbs in Swahili and related languages work like this. This means that words with very many syllables frequently occur.

These long verbs are a problem. It is not a good idea to divide them up artificially since people will probably quickly realise this is incorrect and feel less trusting of the text or even insulted. Such long words cause physical problems in reading. They slow the reader down, as she is unable to take in the word at a glance. Her eyes move backwards and forwards as she works out the word. And if the reader has to pay so much attention to reading a word, she will be less likely to grasp well the general meaning of the text. Sometimes, however, a poor reader may have no difficulty with an important or distinctive long word.

If in doubt about the ease of a passage, be extra careful over sentence length, making sure that there are plenty of short sentences. Try to avoid those grammatical constructions which call for particularly long verb forms. Often a simple verb form can replace a complicated one.

The selection of basic vocabulary can be difficult where the groundwork has not previously been done. In Chapter 3, we saw that large and precise vocabularies develop in different languages around important subjects. Such words are part of the basic vocabulary within their cultures, and any written materials must use them with precision. No outsider, no matter how knowledgeable about cattle, could alone write a good text on cattle-breeding for people with a long tradition of cattle-culture. Advice on word-usage needs to be taken from local people. Even within a single linguistic community, common vocabulary varies from region to region, reflecting local preoccupations and life styles. Lists of basic words made for general use need local refinement. A word easy for one set of people may be rare for others, and vice versa. (21)

Uncommon words in a local language should be used with caution, if we do not know the language well. A word may have ritual or religious significance, and so be used only rarely in particular contexts; or it may be taboo or simply rude. In family-planning education, for example, we should check carefully on all vocabulary.

Frequently, basic vocabulary does not meet our needs, and we have to introduce terms new to our learners. If we must use modern technical terms, we should select those that have grown from the

local language in preference to imported words. Such words will generally be easier for people to learn, and create less problems in reading and pronunciation. Whenever we use an unusual word, we will need to help people to learn it. This can be done by:

1 defining the meaning carefully, preferably with an example or two;
2 providing a situation in which the learner must use the word himself;
3 using the word again almost immediately to reinforce the learning.

In addition, we should give the learner any necessary guidance on pronouncing the word, particularly if it has a foreign root. Finally, once a term has been introduced, it must be used consistently. If, for example, you have felt it necessary to introduce the correct word for 'contraceptive', do not subsequently call it 'a device for preventing pregnancy'.

SIMPLE STYLE FOR OTHER CULTURES

As a starting point, we should discover traditional literary styles and use these where appropriate. We should beware of importing outside conventions into languages where little written material exists. Sometimes the most familiar styles of writing, and therefore the most easily read, do not conform with the usual guidelines for simple writing. An example from West Africa makes the point. Julia van Dyken, writing of her experience in providing reading materials for new readers in the Jibu language, found that simple sentences English-style were no use. (22) This West African language has an intricate pronoun system. A number of clauses are strung together in long sentences, and yet each sentence is perfectly clear, containing only one basic thought: (23)

We have found this true both in speaking Jibu, and from observation while listening to new Jibu readers. Analysis of the Jibu grammar and semantics in natural texts confirm this.

Consider the following Jibu sentence:

Sái wunnun-a ning rag,	- Then man-this said,
bu-a sa afánn ku ka	- thing-which cause lizard fall enter
á byu wawá nin ning,	- into gravy wife-his into this,
waning bir dim fig bu ánin bannan	- this-one cover close not thing on-it not.

Freely translated, this sentence in English reads: 'Then this man said, the reason that the lizard fell into his wife's gravy was that she did not cover the pot with any lid.'

Notice this is not a short Jibu sentence. However, no *clause* has more than 8 words. Each clause is short and simple, and in clear relationship to the other. Jibu readers have no problem reading and understanding such sentences. Naturalness of style and flow of thought must take priority over any restrictions on sentence length. For Jibu readers the short sentence is not so important as the shorter uncomplicated clause.

This Jibu example also throws a light on where natural style and repetition meet in the language. Dependent clauses such as

'that the lizard fell into his wife's gravy' do not usually carry new information. They restate those circumstances which are significant for the one basic thought of the sentence. New information tends to be introduced only in the independent main clause.

In her writing, Julia van Dyken found she had to resist the tendency to repeat a word just introduced, for reinforcement. Repetition confused readers, as it interrupted the natural flow of language; they preferred long sentences connected with pronouns according to Jibu norms. English conventions of style could not be imposed on the language. (24)

This study questions a number of assumptions we might make about writing simply in different languages. It suggests that, where little guidance is available for writing simply in a particular language, we should in general use simple structures and basic vocabulary; but we should also remember that, as Julia van Dyken puts it, 'readability depends primarily on the natural use of the language in which the material is written'.

Most of the testing techniques suggested for English can be used for texts in other languages. The Fog Index and similar tests or the Cloze procedure are likely to require modification. (25) Where long words or long sentences occur frequently even in simple writing, such tests may be unreliable.

TRANSLATION

Texts are best written in the language they are to be used in, by people who speak that language fluently. Where there is a shortage of writers, we may be able to guide inexperienced people, and thus avoid translation. The former Rivers state in Nigeria initiated a project in the late 1960s to produce primary-school readers in the main languages of the state; there were 23 languages and more dialects spoken in the state as constituted in 1967. The following description of the group's method suggests some practical ideas. (26)

A standard outline was prepared for each book. Illustrations were also prepared. Non-professional writers, often university students, wrote the texts. Each text was assessed by a committee which contained both language experts and representatives of local communities. The text was then handwritten on to pages already printed with pictures, and copies printed.

A few pictures and terms would be varied for different languages. For example, maize figured early in the primer in both text and pictures. In one language the word for maize is particularly long, so in this primer it was replaced at this stage by a basket of fish.

Primers in 15 languages were thus prepared in a few years, together with teachers' notes. The process was quick and cheap. Standard texts were prepared in several languages without the need for translation.

Where translation is necessary, the original text must be written clearly and simply. The simpler the original, the clearer the translation. (27) Translators tend to be faithful, sometimes too faithful, to the original, since word-for-word translations often

distort the meaning. A simpler original reduces the scope for error and increases the likelihood of the translator himself understanding the passage well.

The ideas in the text to be translated must also be compatible with the culture of the readers. Anthropologist Colin Turnbull describes a case where this was not so. He had worked in a mine in Canada to raise money for his journey to Africa, and was asked to describe his work: (28)

> Roughly translated back from KiNgwana, the language we were speaking, my account went like this: 'Every morning before the sun rose, a hundred or more of us, all living under the same roof, got up and put on many, many clothes. We even covered our mouths and noses, because it was so cold that water became solid, as hard as rock. Then we went out into the water that had fallen from the sky, not like rain, but like white ashes, and which lay for month after month covering the land and even some of the buildings. We walked from our house to where there were holes in the ground, closed by doors so that you would not fall down them. We got into boxes and were lowered into the ground, taking off our clothes because far below the ground it was warm. Down there it was dark, but we all had torches on our hats. There were paths that led for many miles, and sometimes we walked and sometimes we rode on things like the administrator's motor car, only they had no top. We dug out the rock and made great rooms underground, sending all the rock up in the boxes. White men like the colour of this rock, and they pay a great deal of money for it, and that is how we got rich so quickly.'
>
> At almost every turn of the narrative I was stopped by questioning looks or remarks. The net result was that I faced the choice of being considered a great liar, or as a sorcerer endowed with the most evil powers and in league with evil spirits. The logic of their reasoning was simple enough. Translated back into English, the account looks curious, even to us. Told in KiNgwana to the Africans it was equally curious. But whereas we can equate it with our own experience and knowledge of arctic conditions, of mines, and of the value of gold, these particular Africans had no such experience or knowledge.

To ensure accurate translation, it is helpful to confer with the future translator while writing a text intended for translation. Certain 'untranslatable' bits of a text - such as the story quoted above - will be better simply sketched out, leaving the translator to fill in the detail as his language allows. Other points will need explanation and discussion. A danger point is everyday words used as technical terms, where the translator may not perceive the new precision attached to the term. For example, in 'half a moment' and 'half a minute', 'half' is used first vaguely then precisely. Some things, too, may be easier to say in the second language; in English, it is difficult to refer just to the hook on a crochet hook, whereas Sesotho has one word for the whole tool and one for the hook.

After translation, the text can be translated back into the original language by someone who has not read it before. This will reveal potential ambiguities, but is too laborious for a long text, and not an altogether reliable guide as errors can occur in both

translation processes. We can also check the text without retranslation, testing it on potential learners. Once a text is prepared and even tested in one language, it is not enough to translate it into another and expect it to be clear.

BILINGUAL TEXTS

In countries where more than one language is commonly used, bilingual texts are a possibility. The Botswana Extension College uses them a great deal. In Botswana the majority of the population speaks Setswana as their first language, while English is widely known as a second language, even amongst non-Setswana speaking people. Texts that are presented in both Setswana and English can therefore be read by a larger number of people than texts in either language alone. Moreover those with some knowledge of both languages may use both versions together to check the meaning if it is not at first clear. Figure 7.3, from a booklet on growing fruit trees, shows how both languages can be neatly accommodated on one page.

SUMMARY

The chapter began with three guidelines for writing simply: be clear about what you want to say; say it clearly and simply in appropriate style; and then test what you have written to see if people can understand it. We considered how these could be applied to writing in English, in other languages and in translations.

As writing is difficult, it is better that a writer is not left to make all the decisions on his own. Teachers who are asked to write educational texts are seldom experienced writers. It is advisable to have an editor or an editorial team, who can act as intermediary between writer and learners. The responsibility and effort of planning, writing and editing a text entirely on one's own is normally too much to ask of any one person.

BACKGROUND READING

For a summary of the research about simple writing in English, see: Patricia Wright, Presenting Technical Information.

For alerting you to pitfalls in writing simple English, with plenty of amusing examples: Sir Ernest Gowers, 'The Complete Plain Words'.

For a practical guide to writing: Kenneth Baucom, 'The ABCs of Literacy: Lessons from Linguistics'. This excellent book is relevant to texts for nonformal education in general.

MAKING THE WATER BASIN

Use the sub soil to make a water basin around the tree. Build a ridge around the outer edge of the hole. This ridge is 20 centimetres or two hands high.

This ridge prevents the water from flowing away from the tree. The water will soak into the soil around the roots.

The water basin holds the water you add to the tree at planting time and in the dry season.

GO DIRA LETANGWANA LA METSE

Dirisa mmu o o tswang kwa tlase ga lehuti go dira letangwana la metse go potologa setlhare. Aga thotobolo ka fa ntle ga lesi la mosima. Thotobolo e e ka nna 20 centimetres kgotsa diatla dile pedi godimo.

Thotobolo e kganela metse gore a seka a tswa mo setlharing. Metse a tlaa nwela mo mmung mo tikologong ya medi.

Letangwana la metse le tshegetsa metse ao fa o nosetsa nako ya o tlhoma setlhare le ka nako ya komelelo.

WATERING FRUIT TREES

Add two bucketfuls of water to the water basin after you have planted the tree. Pour the water slowly into the basin.

Water the tree in the early morning or late afternoon. At these times of the day the water will soak into the soil and not be dried up by the sun. The water will soak into the soil better if the soil is broken up into small pieces.

Add three bucketfuls of water to the water basin every three to four days until the tree is three months old.

NOSETSO YA DITLHARE TSA MAUNGO

Tshela dikgamelo dile pedi tsa metse mo lehuting la metse morago ga o sena go tlhoma setlhare. Tshela metse ka bonya mo lehuting.

Nosetsa setlhare mo mosong kgotsa mo maitseboeng. Mo nakong tse, metse a tla tsena sentle mo mmung asa phaphaladiwe ke letsatsi. Metse a tlaa tsena sentle mo mmung fa o tlhabolotswe kgotsa o tsositswe.

Tshela dikgamelo dile tharo tsa metse di tletse mo lehuting morago ga malatsi a mararo kgotsa a mane go fitlhelela setlhare se nna kgwedi tse tharo.

FIGURE 7.3 A bilingual text from Botswana Extension College (reduced from A4 original)

Using pictures

Using pictures in distance teaching - Preparing pictures for easy understanding - Presenting pictures - Diagrams and graphs - How much can pictures teach? - Using local art traditions - Learner participation in producing pictures - Testing pictures - Summary

Pictures can communicate with everyone: those who can read well, or a little, or not at all. However, people who seldom see pictures may find it difficult to recognise what a picture is meant to represent, and even more difficult to comprehend its message.

This chapter is concerned with preparing pictures that are easy to understand. It is about still pictures - drawings or photographs that form part of a printed text. Much of what is said is relevant also to moving pictures, and further discussion of these is contained in Chapter 11.

USING PICTURES IN DISTANCE TEACHING

In nonformal education all printed materials are likely to contain some illustrations. For a literate audience, words and pictures may carry the message together; for a illiterate audience, pictures may be the only printed element; and pictures alone may be used in the form of posters or wallcharts, for publicity or revision for both readers and non-readers. Pictures may be used in the following ways:

1 To stimulate interest. A poster or some other form of visual display is often used to attract attention, or sometimes pictures are used to stimulate discussion which shapes a course of study, as in Freire's approach described in Chapter 2.

2 To explain something that is difficult to describe in words. Pictures are frequently used to explain practical activities, where words alone are inadequate. Diagrams belong to this category.

3 To aid learning. Pictures are used in various ways to encourage learning. A picture can illustrate a fact that is difficult to understand. Photographs or drawings can show things that are too small to see, such as microbes in blood or mites in grain, or impos-

sible to see, such as the internal organs of the human body. One picture from a booklet on health from Tanzania shows enlarged photographs of bilharzia snails beside a coin, similarly enlarged, to indicate the size clearly. Another, from the same booklet, has a photograph of a man, with the position of the liver and other internal organs indicated by an arrow. Beside the photo is a drawing of the same man, with the organs sketched in on his body and labelled. The two pictures together provide a better explanation than either alone.

Repetition can help learning. If a point is made in words, and then again in pictures, it is more likely to be remembered.

Pictures can also be used as signposts, giving guidance to following instructions in a text. A sign, for example, can accompany each exercise or discussion question.

Pictures can be the basis of learning activities, as in language-learning texts, where exercises are often presented through pictures.

4 To remind. A picture can provide a summary of a preceding text. A set of pictures can remind listeners of the content of a radio programme.

Figure 8.1, from 'Your Move', a workbook for adults in Britain learning to read, shows how pictures can perform several functions at once. The photographs help the learner to read the words, and then help him remember them when he reads the page another time. The drawings of a hand are a sign, instructing the student to write.

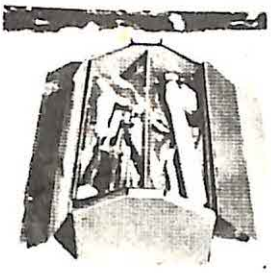
5 For variety. Where study is taking place over an extended period, learners need variety to help hold their interest. Pictures interspersed in a booklet can help provide such variety.

PREPARING PICTURES FOR EASY UNDERSTANDING

First, the subjects of pictures need to be familiar. In rural Kenya, for example, some villagers were unable to recognise pictures of western-style tables and chairs. (1) Pictures are more interesting if they clearly represent local life; many learners will identify more readily with people wearing their own national dress rather than with those wearing European-style clothes or the distinctive dress of a different ethnic group.

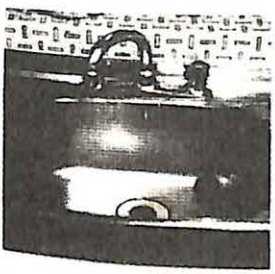
If a viewer does not understand a picture straight away, she may guess from her impressions. Some people in Kenya who were shown a picture of a hoe thought it was a man walking down the road. (2) If you half shut your eyes, you can see why in Figure 8.2. If you are not used to looking at pictures you may adopt an impressionistic viewpoint, not bothering to look hard at the shape. Another reaction is, in a sense, to look too hard at a picture, and latch on to irrelevant details. People search for clues in pictures, characteristic details of features to help them get the meaning of the whole. If they cannot find details they recognise, they may choose others which lead to wild misinterpretations.

A study in Upper Volta discovered that people found landscapes puzzling, but individual items (wild animals, insects, trees) were easily recognised. A particular species of tree, for example, was quickly identified from its thorns. Once a subject was familiar,



1.

The tool kit / fit is open.



2.

This is a kitchen sink / rink .

3.

The car is skipping / skidding .

4.

He has a stick / slick .

FIGURE 8.1 Pictures for reading, pictures for reminding, pictures as signals

FIGURE 8.2 A drawing of a hoe from the Kenya survey

the viewers moved quickly to examining the detail. If subjects were puzzling, the viewers would start by working at details, which might be irrelevant (rabbits in a corner perhaps, or clustered huts in a landscape with village, which in one case were seen as full sacks). (3) If the detail is confusing or wrong, then the whole picture may make nonsense. In rural Kenya, where goats are very common, people were shown a drawing of a goat, which had its tail turned down. (4) All of its other features were accurate but many people knew it could not be a goat because their tails turn up, so decided it must be a cow. In the same study people were shown the drawing of a tortoise shown in Figure 8.3. Few recognised it; the others started puzzling over its features. Those who focused on its head saw it as a snake; those who looked at the feet thought it was an elephant, and the shell told others it was a crocodile. Similarly a church was seen as baskets (lattice work on the windows) or even bullets (the shape of the windows). (5)

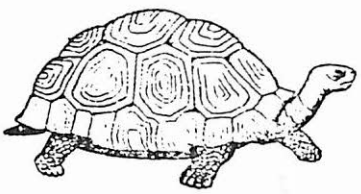


FIGURE 8.3 Tortoise from the Kenya survey

Unnecessary details should therefore be avoided. It is tempting to try to make a composite picture look more authentic by including plenty of detail characteristic of the environment. This can simply cause distraction. In the Malagasy Republic some agricultural posters were prepared for village farmers. (6) Details like tufts of grass, seeds or puddles evoked ideas of sky, cloud and stars amongst the peasants. It was also noticed that the first thing most people looked at was any human figure in the picture. They would try to identify what he or she was doing. This suggests that pictures will be most successful if they centre on a human activity and cut down on surrounding detail.

Another example of distracting detail comes from Botswana, where some drawings illustrating a distance-teaching course on vegetable gardening showed a cat sitting by the garden fence. In one training session, group leaders were worried by this cat and spent some time discussing its significance. (7) More seriously, irrelevant detail may lead to complete misinterpretation of a message. In a picture used in a health-education project in Ghana where the main feature was meant to be a girl throwing rubbish on a refuse tip, she was thought to be feeding the animals which were present in the foreground. (8)

Details in pictures need to be absolutely accurate. There should be no mistakes in realism. In Upper Volta a picture of a woman carrying spinach in a sack distracted readers as local people always carry it in baskets. (9) On the other hand a picture used in Zambia of a woman preparing food was much appreciated; people could tell not only that she was preparing 'nshima' from the way she

was pounding it, but also confirmed their opinion by looking for, and seeing, the dust flying from the bowl. (10) Details like this can act as important cues for interpretation.

If colour is used in pictures, this too should be accurate in every detail. Inaccurate colouring, just like inaccurate drawing, can confuse people. (11)

Illustrations of culturally important subjects need particular care. A primary-school teacher, working in a sheep-farming district of England, drew a picture of a sheep on the blackboard and asked the children what it was. She was surprised by the silence. Eventually she discovered that the children knew it was a sheep, but were trying to work out its breed. (12) Similar problems are likely to occur elsewhere where one animal or plant is a dominant part of the economy. Jomo Kenyatta in his book on Kenya recounted how young Gikuyu men used to be taught to 'count' cows by memorising their individual features and markings. (13) For these people, a picture of a cow would probably evoke the same response as the sheep in the English hill-country. In a literacy project in Somalia picture/word cards of camels or grass were of little use; there are so many words for these in Somali that learners were confused when expected to fit one particular word to a picture. (14)

Gross distortions in size, particularly enlargements, are difficult to understand. Several tests have been done on people's recognition of pictures of enlarged insects. In Lesotho three pictures of a fly were presented to a sample of both illiterate and literate people. One fly was drawn life-size, one 7cm long and one 17 cm. While 67 per cent of those interviewed recognised the life-size fly, only 47 per cent and 27 per cent respectively recognised each of the larger ones. The literate people in the survey were rather better at this than the others. (15) People who misunderstand such pictures may try to identify the insect as something else; some people who were presented with a picture of a large tsetse fly tried to classify it as a type of cicada. (16) Or they may decide that the picture is irrelevant, as in the often-told story of a picture of a large mosquito; people looking at it decided it did not concern them as they only had small ones around.

Objects are better represented in their entirety. An arm or a foot alone may not be recognised. (17) An object seen from an unfamiliar angle can also be hard to understand. The back end of a cow or a foreshortened picture of a man running are two examples that have proved puzzling. (18)

Perspective causes great difficulty. In Lesotho local country people were shown two different pictures. The interviewer made sure that people recognised the items in the picture and then tested their understanding of perspective by asking them how far or close the objects were to each other. The results showed that only about a fifth of the people saw the pictures three-dimensionally. For one set of pictures, the literate people did only slightly better than those unable to read. (19) Fortunately, there are few occasions when interpretation of perspective is crucial to understanding the meaning of a picture. The main exception is diagrams, which will be considered in more detail later.

Signs or symbols may not be understood. In one picture used in Ghana an empty bowl by a thin child was meant to convey that the

child was malnourished. The bowl was dominant, in the foreground, but few people realised it had any relationship with the child; many thought it was an empty wash bowl. (20) Where objects are meant to have a symbolic meaning this may be missed completely. Sometimes the symbolism may be less obvious, but cause just as much misunderstanding. In Kenya, a health poster was once used which portrayed a stereotype of a health assistant with the message, 'This man is your friend.' Reactions included 'I don't know his name' or 'That man is not our health assistant; ours has a beard.' (21)

Signs taken from comic and cartoon conventions such as arrows and speech bubbles can cause difficulty. In one poster about industrial safety, for example, stars and lightning-flash marks were used to indicate that a man had hit his head. This symbolic element introduced in an otherwise clear drawing was not understood and confused people. (22) In Benin a comic-strip format is being used for literacy work; those producing the materials have been surprised to discover how many conventions they use inadvertently in their drawings, such as stylisations to denote water, or changes of perspective and angle to denote movement. (23)

Sequences of pictures, using the comic-strip convention, should be used with caution. The sequence of six pictures without words in Figure 8.4 was presented to a sample of both literate and illiterate rural people in Lesotho. Just over two-thirds of those who saw the pictures were able to follow the story line fairly accurately. Most saw the point of the story, and most knew where it started and ended; but even so, most people misunderstood a few points. In fact, taking the total of those who could not follow the basic story line and those who made one or more mistakes in interpretation, it was found that 65 per cent of the sample had misunderstood the strip in some way. (24) Sequences of pictures without words are therefore very likely to be misunderstood.

This is again illustrated by the story of the southern Ghanaian van driver who liked comic strips, so painted on his van pictures of a thin child consuming his product and growing healthier. He forgot that in the north of the country, where many people read Arabic, his message would be read from right to left.

A single picture should not contain a complicated message, or a sequence of events. One over-complicated photo showed a dog near faeces in the background, and flies in the foreground near food, to indicate that rubbish encourages disease. Many people did not see the two features as related. (25) The picture shown in Figure 8.5 was a poster designed at a workshop in India. The workshop organisers describe what happened when the poster was shown to local farmers: (26)

> The main components of the poster (the rats damaging the wheat crop and the dead rats) were interpreted correctly by practically all farmers, there were still only 10% of the farmers who fully understood the message - 'that rats should be killed because they damage crops'. The other 90% of farmers only gathered from the poster that 'rats damage wheat'. This was somewhat surprising since over half the farmers were literate and could read the caption 'kill rats'. The explanation offered by the action research worker was that there was nothing to help the farmers to relate the two parts of the poster - the live rats in the crop and the dead rats below.

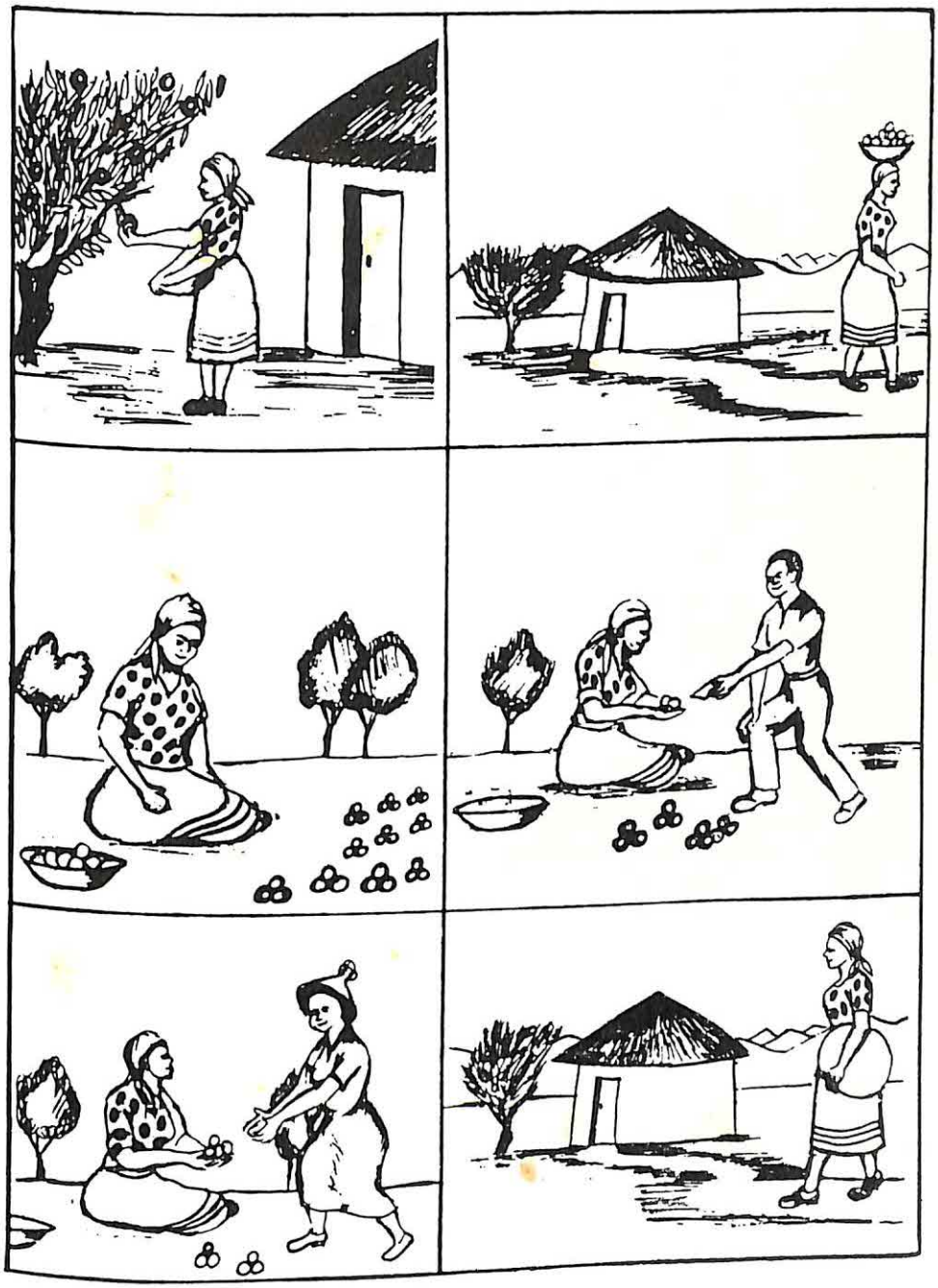


FIGURE 8.4 Comic strip without words

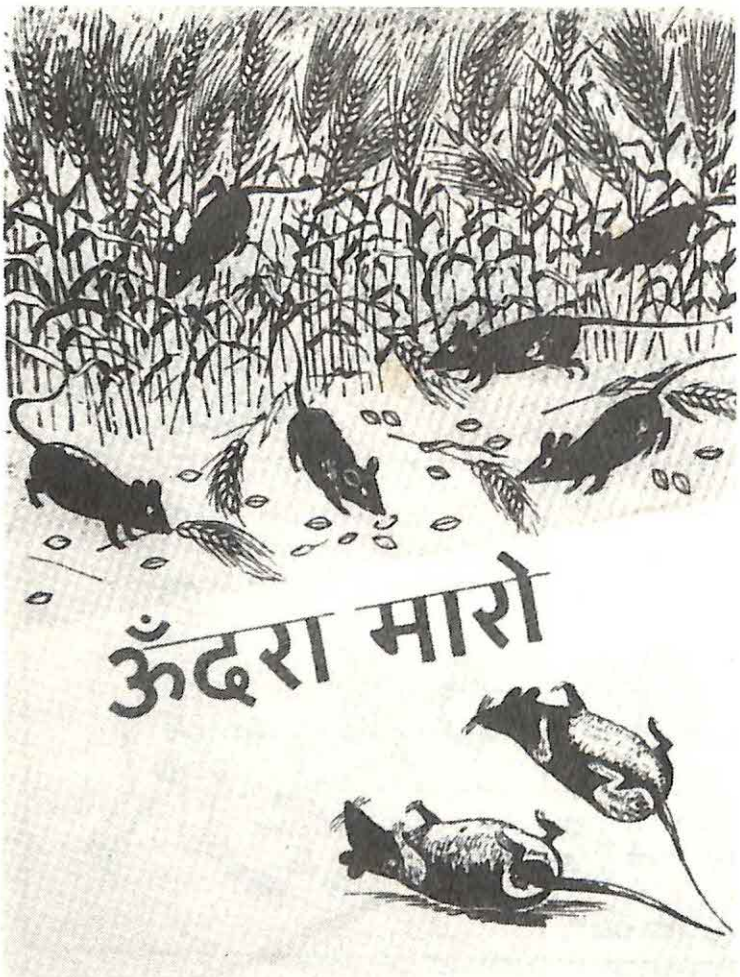


FIGURE 8.5 'Kill Rats.' A poster from a workshop in India

In both these cases, sequences of pictures, carefully explained, would have been better.

We should avoid presenting pictures which require the reader to infer what has happened before or what is going to happen afterwards. Each step in a logical sequence needs to be shown separately, without excluding any steps and without putting more than one step in the same picture. Pictures displayed on facing pages should be distinctly framed, or they may be seen as one picture.

Explanation is essential. Questions drawing attention to pictures - 'What is this woman doing?' - are probably better than captions or descriptions. Where radio is used, understanding is increased considerably if precise, direct reference is made to accompanying pictures. Pictures have more effect if people look at them for long enough. (27) Question-cues rather than captions have the effect of making people focus on the message, while questions for discussion or written answer reinforce this. Figure 8.6, from a

Tanzanian correspondence course in history, shows a text containing questions which draw attention to the picture.

The Middle Stone Age

This period started about 10,000 B.C. For some thousands of years man's way of life did not change much.

What was life like during the Middle Stone Age?

Man was still living in caves. The early men of Middle Stone Age formed groups. Living in groups, man could protect himself from wild animals and work was easier. Fire which was discovered during the Early Stone age was widely used at this period. From Figure 9 can you find out how the early man discovered fire? What was the use of fire to man? Fire brought many changes in the day to day life of man.

Fig. 9

Man is making fire

a) With the use of fire to warm them, man could now use the caves as a means of shelter and protection.

FIGURE 8.6 'Man is making fire'

PRESENTING PICTURES

There is a variety of ways in which pictures can be presented:

Photographs	-	colour
	-	black and white
	-	with the background removed
Line drawings	-	realistic (outline or shaded)
	-	stylised (e.g. cartoons or stick people)
Diagrams	-	showing how things work, what they look like, relationships

Figure 8.7 shows the same picture presented in six different styles. How do we choose between them?

A number of studies have been done comparing different styles of presentation. (28) Some have come out in favour of one form, others of another. But differences have been slight, and on the whole any form will serve most purposes. The content of the picture and the quality of reproduction are more important than the style.

Two considerations should, however, influence a choice of style. First, what function will the picture have? We saw in Chapter 7 that different kinds of tables and charts were each effective in communicating different kinds of information. In the same way, different styles of pictures can be more or less appropriate for particular purposes. A photograph or highly realistic drawing may show a biological process less well than a simple line drawing. But it may be a better medium for teaching the identification and naming of parts of a specimen. (29)

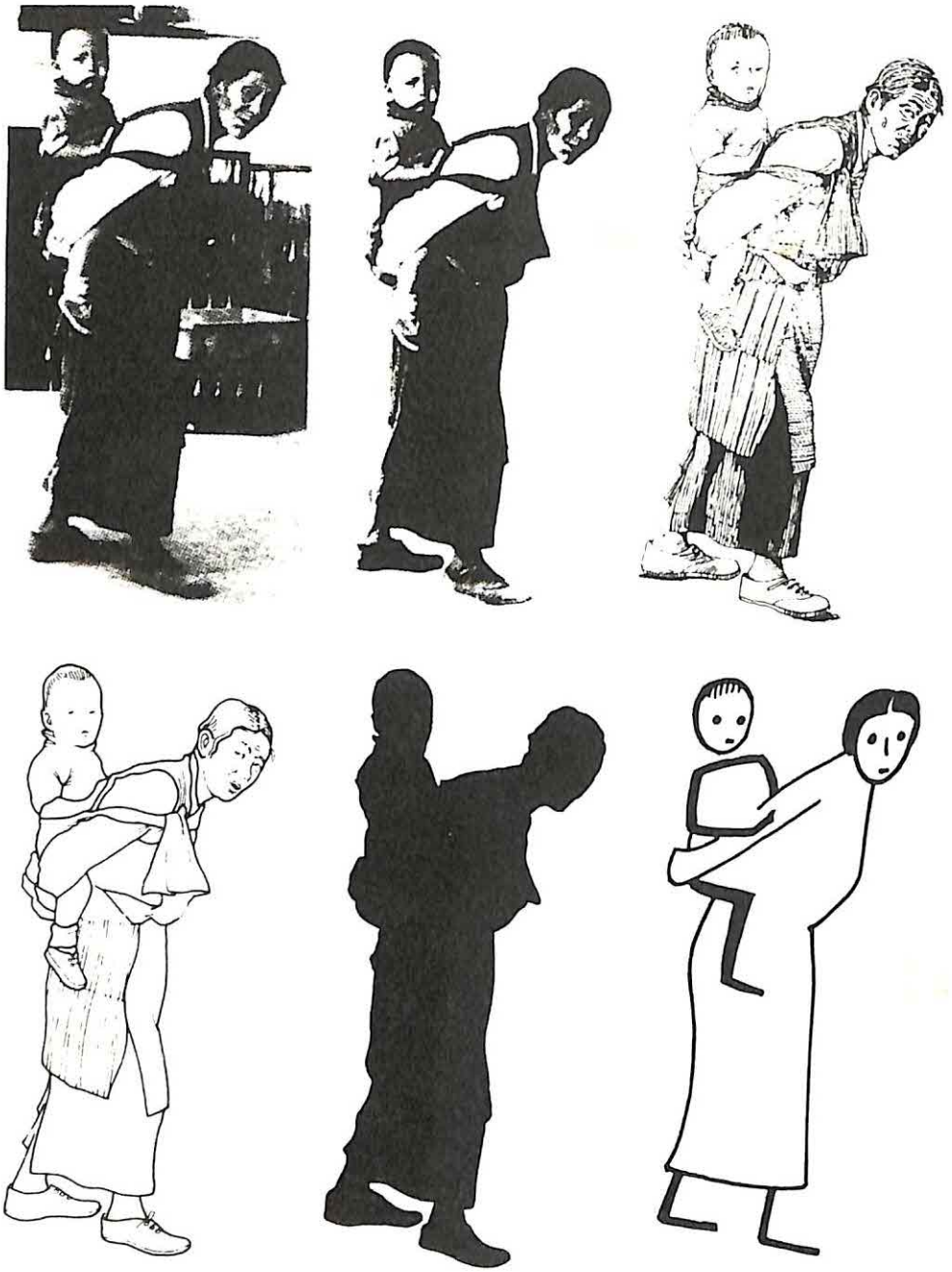


FIGURE 8.7 Six styles of picture: mother and baby from Nepal

Second, will the picture be easy to understand? Sometimes the background in a photograph can be distracting, and is better obliterated. Or sometimes the background provides a setting which assists understanding. Figure 8.8 is from a simple booklet for health workers in India. In the first picture, mother and baby are shown in a normal setting, and the background helps set the scene. In the second picture the bowl is photographed so that no distracting background intrudes. Shadows in photographs can be confusing, so outdoor photographs are better taken when the sun is high. Where comparisons have been made between picture style, people tend to have a slight preference for photos of any kind over line drawings, but that does not necessarily mean that photos teach more effectively. Quality in print is easier to achieve from drawings than photos. On the other hand in a photograph there is less likely to be a mistake in detail.

Research on colour in still pictures tells us only that people sometimes prefer pictures in colour. With television, colour programmes are no more effective than black and white ones. (There are some exceptions; certain topics in biology, for example, require the use of colour.) (30)

Sometimes colour is necessary in still pictures to ensure the understanding of details. The example in Figure 8.9, from the Botswana Extension College's vegetable-growing course, shows someone contentedly carrying a bundle of carrots he has just grown. 'White' carrots look much like other root vegetables and colour would have helped accurate identification.

Stylised drawings of any kind should be used with caution. We have seen already that people have difficulty in following a sequence of pictures without words. However cartoons and comic strips are attractive and easy to assimilate once readers have become accustomed to the style. Recently such formats have become more widely used in nonformal education. Mostly these have used photographs, as in Lesotho Distance Teaching Centre's photostrips or the Ecuador nonschool rural education project's fotonovelas, or realistic drawings, as in family-planning education in the Philippines. All materials of this kind should be carefully tested. (32)

Stick-figure drawings are easy to understand and could be used in the local production of materials where an artist is not available. (33) One drawback is that, though people may easily recognise the drawings, they may not be able to identify with such abstract presentation. Learning would probably depend heavily on the effect of the text accompanying the pictures.

DIAGRAMS AND GRAPHS

Diagrams and graphs are particularly difficult to understand and need great care in presentation. Diagrams give a schematic representation of objects or processes, while graphs are a symbolic representation of relationships between quantities. They can be used for communicating information or describing a structure or process.

The central problem is that such forms of presentation are conceptually difficult. Objects or facts are translated into a symbolic form - a number, sign or line - and then presented in an abstract format. Well-educated adults often make mistakes in reading graphs, while diagrams often fail to deliver their message. For example, (34)

This mother is feeding soft food to her baby. He is only 4 months old. He is growing bigger. After 4 months mother's milk does not give baby enough food. So baby needs extra soft food. Then he will grow well. If mother does not have enough milk, or there are twins, or mother has died, baby needs soft food **before** 4 months. This is very important.

14

Usually a mother should start giving soft foods to baby when he is four months old. Porridge is a good first food for baby. Mother roasts a cereal such as wheat, maize, ragi or millet and grinds it finely. She can store this in a tin, and cook it with water or milk, a little at a time. Cooked rice can be given, mashed until it is very soft. Mother mixes the cooked food with a little milk or water to make it soft. She uses a spoon or a local feeding vessel to feed baby.

15

FIGURE 8.8 Two pages from a booklet for Indian health workers

FIGURE 8.9 Line drawing where colour might help: onions, greens and ... carrots?

> children aged ten to fourteen years were shown cross-sections of a doll and a stand, and required to match these to the three-dimensional drawings of these articles. Only 8.4 per cent of all these children made perfect scores, and 38 per cent scored little or nothing; though the older children did better than the younger ones.

If these forms are so difficult, why use them at all? Just as flow charts and lists sometimes communicate more clearly than prose, so graphs and diagrams are sometimes clearer than words,

numbers or pictures. (35) A graph, for example, may record a baby's growth (see Figure 8.11); a diagram or series of diagrams may explain a process, such as the spread of malaria by mosquitoes, or may describe how to make something (see Figures 8.12 and 8.13).

There is a variety of graph forms to choose from: line graphs, histograms, block charts, pictograms, pie charts. Figure 8.10 provides some examples. We do not know whether any of these is intrinsically easier to understand than any others. Possibly graphs using lines alone are most difficult, being more abstract, while bar charts are relatively easy to explain and use. Pie charts, although they look simple, involve the idea of cutting a circle into segments from the centre. This idea is familiar to people who eat circular pies and cut them in this way. It may be quite new to others. Pictograms are also deceptively simple. It seems attractive, for example, to present recommended food consumption in little pictures representing quantities of different foodstuffs. The problem is that these pictures are symbols representing a quantity. A symbol, say, of a cabbage, may be used to represent ten cabbages, or a particular quantity of any number of green vegetables. One cabbage symbol for an adult's diet may involve drawing half a cabbage for a child; and a cabbage one centrimetre high may sit next to a cow, representing meat, also one centimetre high.

Even though graphs are difficult to understand, they are sometimes so well-fitted to a particular task that they can be effective. The growth chart shown in Figure 8.11 can be read and used by illiterate mothers. When they have learnt how to use it, they can compare their own baby's weight (the dotted line) with averages for boys and girls (the two solid lines).

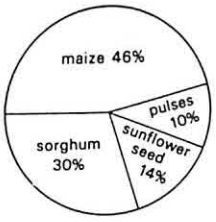
Diagrams are often required to teach practical topics, particularly where measurement or construction is involved. Those which represent three-dimensional objects are especially confusing, as they may demand understanding of perspective. The example in Figure 8.12 comes from an Indian booklet on grain storage. Ninety per cent of the farmers who read the booklet understood the text, but only half could understand the diagram. (36) A further example from Kenya showed a drawing of a latrine hut, with part of the roof cut away to show the internal construction. Many people interpreted this as meaning the hut should be built thus, with a hole in the roof. (37)

The diagrams of a rabbit hutch in Figure 8.13 were used in Lesotho to investigate understanding of measurement. People were asked, 'Can you tell me how far above the ground is the floor of the box? Show me with your hand.' Most people's estimates were wildly out. The picture with both man and measurements was slightly better understood than the other two. (38) Even with careful presentation, information involving measurements is often imperfectly understood. Any practical help will be useful, such as a measuring string or paper tape included with teaching materials.

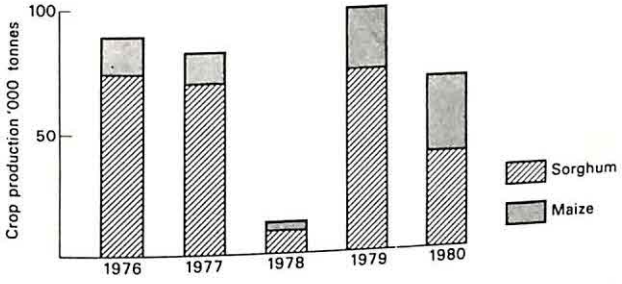
A clear diagram does not contain too much information. (39) If, for example, we are aiming to represent several stages of a process we should provide a separate diagram for each step, where possible to a constant scale. Each diagram or graph needs a title, its scale should be explained, and labelling should be easy to read. Where many items in the same diagram require labelling, use a numbered key. The accompanying text should be fully explanatory, and set close to the graph or diagram.

The examples show some of the ways different forms of graph can be used to display information for different purposes. The data is such as might be found for cash crops in a small country.

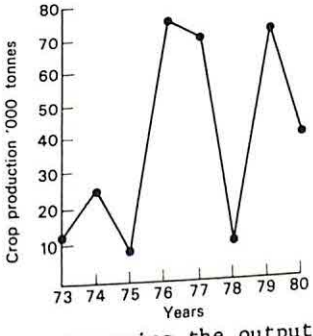
1. Pie chart: four main cash crops, showing the proportions of output.



2. Bar chart: two crops, comparing annual output.



3. Line graph: one crop, showing the variation of output over two years.



4. Pictogram: one crop, comparing the output in different villages in the same year.

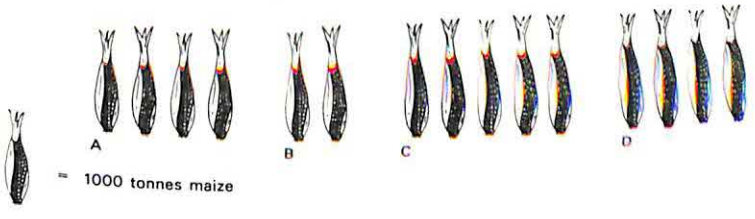


FIGURE 8.10 Some common forms of graphs

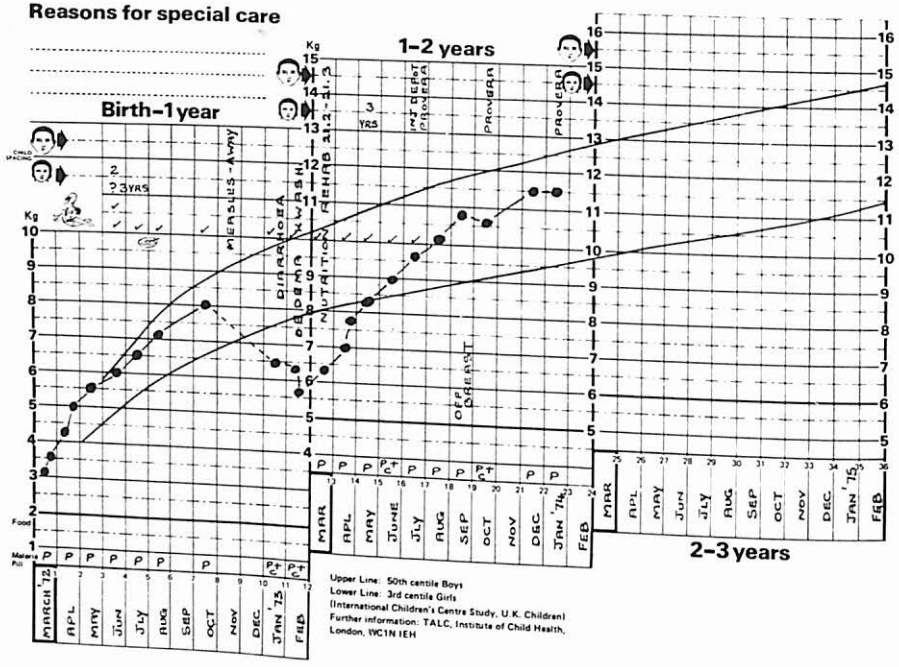
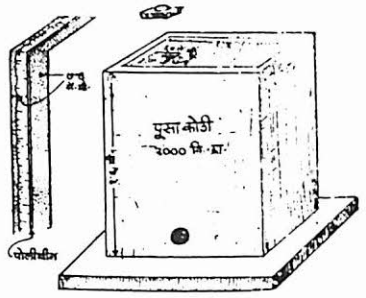


FIGURE 8.11 An infant weight chart

जो कोठे या भंडार बनाए जाते हैं उनमें कुछ सुधारों के साथ उन्हें समुन्नत, नमी एवं कीट-रोधक बनाया जा सकता है, जिनमें वायु है, संचार अच्छा एवं तापमान एक सा रह सके।

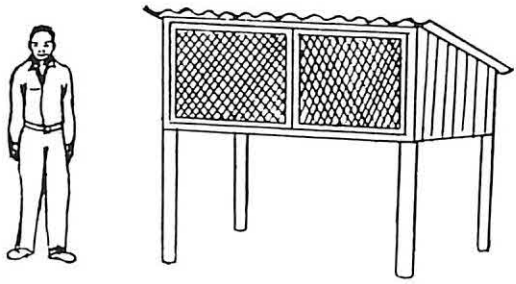
भंडार बनाते समय उसकी हर दिवार के अन्दर पोलीथीन की एक खड़ी परत रख देने से भंडार के अन्दर सीलन नहीं आ सकेगी और तापमान एकसा बना रहेगा। इसके लिये पूसा कोठी एक अच्छा नमूना है।

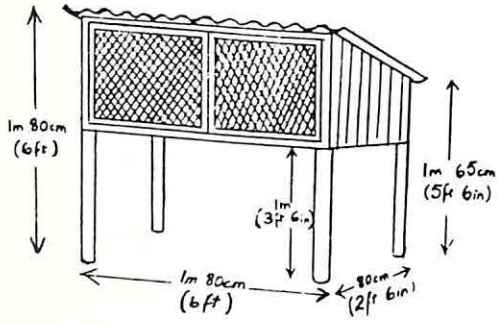
'पूसा कोठी' का बनाना बहुत आसान है। अनाज चूहों से बचाने के लिए कोठी पक्के चबूतरे पर बनाते हैं। २००० किलोग्राम अनाज रख सकने वाली कोठी की कीमत करीब७५)रुपये होती है। ऐसी कोठी का विस्तार निम्न लिखित है।



१.६ मीटर × १.४ मीटर x१·० मीटर(मोटाई)। कोठी का चबूतरा कच्ची ईंटों का बनावें है, जिसके ऊपर १.८×१.४ मीटर आकार की प्रस्काथीन की चादर (७०० गेज) फैला दें। फिर ७ सेंटीमीटर ४)

FIGURE 8.12 Page from a booklet on grain storage. What does the diagram mean?





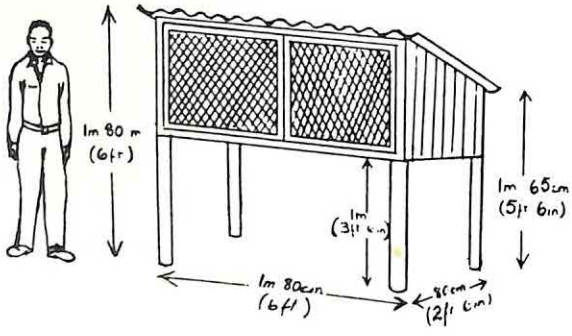


FIGURE 8.13 What size is the rabbit hutch?

HOW MUCH CAN PICTURES TEACH?

One excellent way of presenting material mostly through pictures is the photostrip or photo booklet. A series of pictures is presented, each with a short explanation carrying the story line. Research in Lesotho on photostrip booklets suggested three points to pay attention to. (40) First, take all photographs in a series from the same angle. Second, take care that photographs are of high enough quality. If the printing is poor, a person's face may not be recognised as the same in each photo. And third, each photo needs to have a firm white margin round it, so it is clear when there are two photos on facing pages or one right across two pages.

Non-readers can use such booklets in groups where someone reads the text aloud. Flipcharts of photos or drawings can also be used for non-readers, along with a face-to-face or radio talk. A flipchart consists of large sheets of paper or card fastened together at the top. It can be hung up or stood on a flat surface. Each sheet contains one large picture, or sometimes words. The pages are turned following instructions. A non-reader can do this correctly, with instructions given over the air. Pictures must be boldly and clearly printed, so that each group member can see them distinctly from where he sits. If colour is used, it is helpful to brighten the natural colours slightly so that they show up clearly from a distance. (41)

Illiterate people may also learn a limited amount from posters. Indeed even posters with words are much more effective if the picture conveys the message well. (42)

USING LOCAL ART TRADITIONS

Traditional styles of painting and drawing are a useful source of ideas. The poster in Figure 8.14 uses a traditional Ethiopian style of painting in a poster to encourage breast feeding and a nutritious diet for infants.

A survey of traditional art in the Ivory Coast shows how rich the potential can be. (43) Outside walls of houses are frequently painted in a variety of styles. Geometric patterns are widespread but they are slightly irregular and lines are not absolutely straight. Sometimes a series of pictures tells a story, in some cases traditional, in others cowboys on horseback chasing round the house. One picture of an ex-seaman's house is a rough diagram of the inside of the boat he used to travel on. People, animals and objects are the main subjects of wall paintings; pure decoration, apart from geometric design, is rare.

In some cultures, most traditional art is of religious significance. In such a case, there is a risk of offending people by using sacred forms for secular messages. In other cases, there may be no suitable local traditions. A recent study in Nepal, for example, found that rural people there had no ideas that pictures could teach. But usually learners will welcome pictures in a familiar local style. Modern paintings done by Chinese peasants show how an old form can be adapted to modern needs. (44) All the delicacy of ancient Chinese styles is present in the dynamic and instructive pictures

FIGURE 8.14 A poster on infant nutrition from Ethiopia

now being produced, as Figure 8.15 shows. The original is painted large on a wall, and the artists have overloaded the trees with fruit in order to encourage belief in scientific farming.

A study of traditional art will indicate what people expect to find in pictures. The examples from the Ivory Coast, for instance, suggest that people in that country like pictures to tell a story; they also prefer pictures to be simple and undecorated, unless the decorations are geometric patterns.

LEARNER PARTICIPATION IN PRODUCING PICTURES

It is possible to present people with elements for composing their own pictures. In the Ivory Coast members of women's learning groups enjoyed composing their own pictures with flannelgraphs - simple fabric cut-outs that stick temporarily to a felt surface. (45) In the Philippines, groups have enjoyed making pictures using cut-out figures with moveable joints. (46) Another possibility is to provide sheets printed with pictures to cut or press out. In a nutrition course, for example, a package of cut-outs of all foods commonly available in a country could be provided; people from different regions could then use these to devise a variety of menus using only those foods available locally. Some activities popular with children suggest other ideas: books where on one page there is an outline drawing and on another peel-off pictures to stick on the outline; or paper dolls with a choice of clothes to peg on them; or scenarios like those often printed on breakfast cereal packets, with cardboard figures to place on them. When pictures must be suited to local conditions it might be worth adapting and trying out some of these ideas.

TESTING PICTURES

Since pictures can communicate something to everyone, standards of picture production should be high. Poor pictures will exclude from understanding those very people who cannot benefit from messages in printed words because they cannot read. Pictures must always be tested to check whether the majority understands them.

It is probably sensible to test alone pictures that are ultimately to be used with words; tthe testing itself will give a clearer indication of what explanation will be needed. Testing should discover whether most people recognise the subject of the picture, and what their attitude is towards it. Attitudes can vary sharply from place to place, so the people used for the test should be carefully chosen to represent future learners.

We need to discover as well whether people understand the point of a picture. Questions such as 'what does this picture teach you?' may reveal this. Some research conducted in Lesotho suggests that even where people understand the content of both pictures and text, it is still necessary to spell out explicitly the message implied by them. The following text in Sesotho accompanied a series of seven photographs:

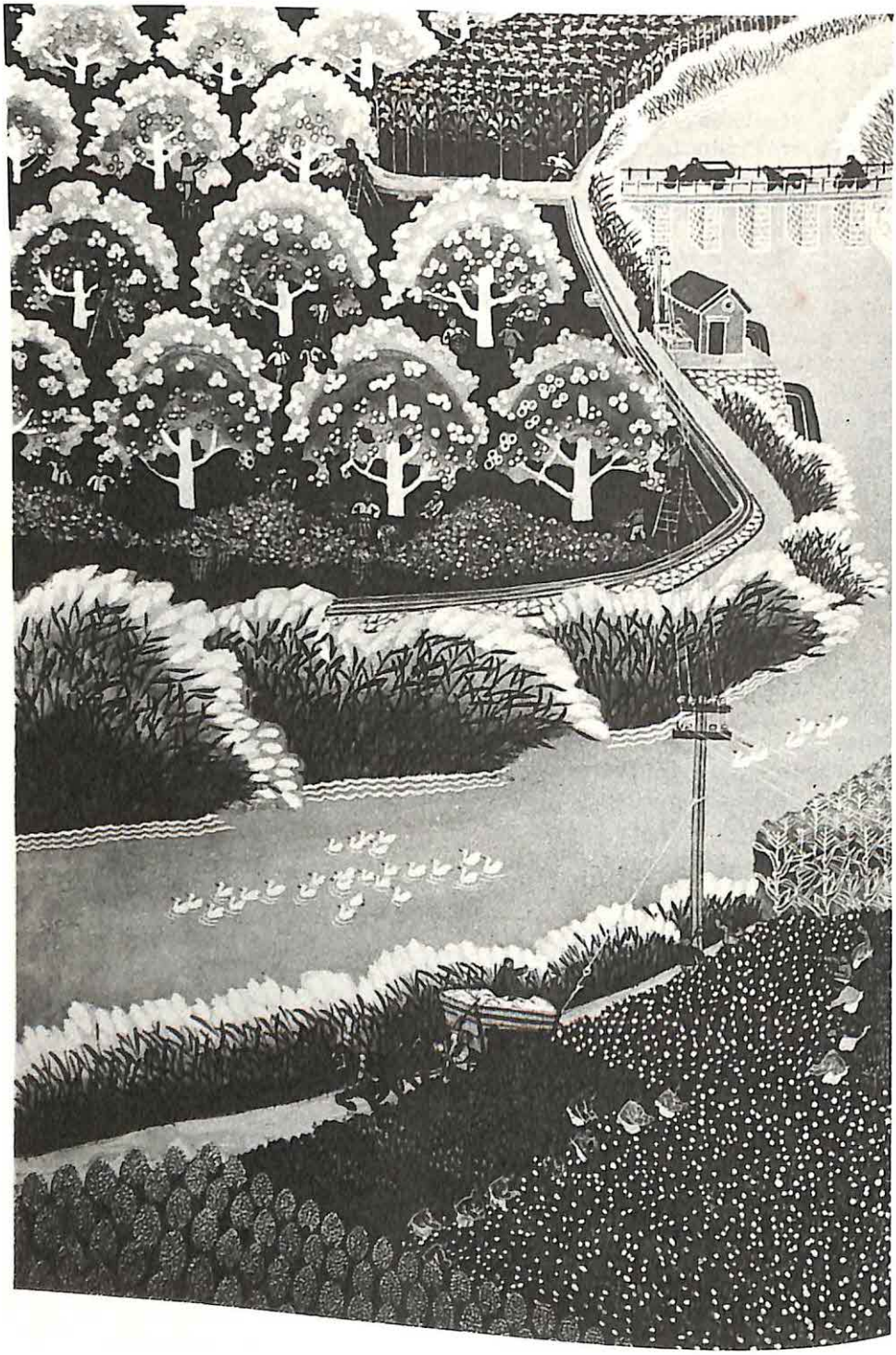


FIGURE 8.15 Chinese peasant painting

1. Thabo is always sleeping in class.
2. His teacher wakes him up angrily.
3. The teacher speaks to Thabo's mother:
   'Mother of Thabo, your son won't pass his exams if he doesn't pay attention in class.'
4.& Thabo's mother is worried. She discusses the problem with
5. her friend.
   Friend: 'Try giving Thabo a good breakfast before he goes to school.'
6. Now Thabo gets mealie porridge, milk and beans before he goes to school.
7. Now Thabo is top of the class.

A number of rural women who could read were shown the story. Almost all of them understood both pictures and text and could repeat the story but, when asked, 'What does this story teach you?', a quarter did not see the moral, 'Give your child a good breakfast before school.' They came up with answers such as, 'School discipline is very strict.' (47)

SUMMARY

Pictures can be used to explain points, to aid learning, to act as a reminder, and to provide variety. They can be used with both literate and illiterate people, providing for the latter a useful alternative to printed words. They should contain familiar subject matter and accurate details. Distortions in size and angle of vision should be avoided, as well as symbolism and signs, unless these are used in the local culture. Each picture should contain only one message, and there should not be too much detail. All pictures should be accompanied by an explanation, preferably a question drawing attention to the main features.

The style of presentation of pictures, whether drawings or photos, does not matter; styles should be chosen to fit the job to be done. Special care should be taken with diagrams and graphs, as these cause particular difficulty.

Local art traditions or popular art forms can provide ideas for illustrations. Flannelgraphs or cut-outs of various kinds give people an opportunity to create pictures which closely match their experience.

All pictures used in nonformal education should be tested before publication, to ensure that they are understood.

BACKGROUND READING

There are many research reports about pictures. A recent and useful one is: Lesotho Distance Teaching Centre, 'Understanding Print'. Another report concerned with educational practice is: John Bowers et al., 'Action Research in the Production of Communication Media'. Finally, the following are stimulating and beautifully produced: Andreas Fuglesang, 'The Story of a Seminar in Applied Communication' and 'Applied Communication in Developing Countries'.

The production of printed materials

Different printing methods and their potential - Selecting and combining different methods - Paper - Readability and type style - Typeface style and size - The arrangement of the text - Page design and preparing artwork - Preparing for print

Texts must be presented in a form that is attractive and easy to read. This chapter gives guidelines on how to lay out texts so they are easily understood. They will enable you to choose a style of presentation which fits with the needs of your readers.

Choices of style are limited or extended by the methods of printing available. First, therefore, we look at different printing methods. If you do not already own or have access to printing equipment, the discussion may help you to select what is appropriate to your needs. If you already have access to printing facilities, the information will help you make best use of this equipment. (1)

DIFFERENT PRINTING METHODS AND THEIR POTENTIAL

Methods of reproduction can be grouped into printing, including letterpress, lithographic and screen process printing; and duplicating, including stencil duplicating and xerography. The first methods are the best if we need to produce many copies, or in printers' language, a 'long run', of a text.

1 Letterpress printing

The text is made up from metal letters, made in reverse. The letters are inked and the image transferred to paper. Printing machines vary greatly in size; there are two types: flat, known as 'flat bed', and rotary, where the text is transferred to a plate fitted round a cylinder. For our purposes, letterpress has a number of strong points:

1 Letterpress machines are fairly common in many countries.

2 The type does not wear out easily, so that a clear text is

still being printed after thousands of copies have come off the press.

3 The type is easily stored without risk of deterioration, so that reprints can easily be made.

The disadvantages are:

1 The labour in setting up the text, whether it is done mechanically or manually, is expensive for short runs. The variety of printing work in distance teaching means we need access to an alternative method more suitable for short runs. (This disadvantage is considerably reduced in countries where the cost of labour is low.)

2 Illustrations have to be cut by hand from wood or another suitable substance, or made photographically with special equipment. Use of illustrations is therefore costly and must generally be restricted.

2 Lithographic printing

The process is based on the fact that oil and water will not mix. The background to the text is greased so that ink will only stick to the part to be reproduced. The text can be prepared in a number of ways. It can be set in metal type, a print made, and a photograph taken of the print. It can be typed directly on to some kinds of paper plate. Most often, it is typed on ordinary paper, and photographed so that the image is transferred to a metal or paper plate. Illustrations are stuck into position and photographed with the text. Line drawings often do not need any special preparation for this, though fine detail can often best be reproduced by making a large original drawing and reducing its size photographically. Photographs print more clearly if they are rephotographed through a screen which transforms the picture into a set of fine dots.

Once the finished text, called the 'artwork', is on a plate, it is then printed on to a rubber-covered cylinder and from this transferred to paper. This intermediate process between plate and paper has given this technique its popular name, 'offset litho'.

There are a number of features which make lithographic printing attractive:

1 The text is easy to prepare. It can be typewritten, handwritten, or set in metal letters.

2 We can choose between cheap paper plates for short runs or more durable, more expensive metal plates for long runs. Many offset litho printing machines handle both metal and paper plates.

3 Any kind of illustration can be reproduced with little difficulty.

4 The quality of reproduction remains good for the complete print run, provided artwork is carefully prepared and the right kind of plate is used for the number of copies needed.

5 Reprints can be made from metal plates. Paper plates may also be used for reprinting, though they are more difficult to store without damage, and start producing fuzzy print after between 200 and 1,000 copies, depending on their quality.

6 Alterations can easily be made to the artwork at any stage

before platemaking. If alterations are needed before reprinting, new plates can be made of selected pages.

Poor quality in offset litho printing is usually due not to shortcomings in the equipment but to the way it is used. The preparation of the artwork, the photography and the printing require skilled and careful work. A good and experienced printer can produce fine results with basic offset equipment but for some work, such as the reproduction of fine detail in photographs or colour printing, a bigger range of machinery may be required. In order to be sure of good results in printing, we always need to define the limits of our equipment and assess the skills of our printer.

3 Screen process printing

This is a stencil process. A stencil is a thin plate, usually of some kind of paper, where the lines and surfaces to be printed are cut away, and ink is then pressed through the holes.

In screen printing, a stencil can be cut by hand or made by a simple photographic process. It is then fixed on a bed of nylon or similar material stretched across a frame. This is called a 'screen'. Ink is then rolled on so that it is pressed through on to the paper.

This is not a process to use for long print runs or for texts with many pages. However, it is a good method for reproducing illustrations, and is often used for posters. As the screen can be made for whatever size is required, it is a useful standby to supplement a small printing press or duplicating machine. The equipment costs little, and can be home-made. The printing process is labour intensive, but simple.

4 Stencil duplicating

A stencil is cut, fitted to a duplicating machine, and ink is pressed through the holes on to absorbent paper to make copies. There are different ways of cutting the stencils, each producing different quality results.

(a) The traditional method. With the ribbon pushed out of the way, an ordinary typewriter is used to type a waxed stencil. The wax is pressed through the stencil onto a backing sheet, normally carbon backed with another sheet behind so that a printed 'proof' copy is made for checking the text. Corrections can be made by rewaxing the stencil with correcting fluid and retyping. Line drawings or handwriting can be cut on the stencil with a pointed instrument called a stylus. Precautions must be taken to keep the typewriter clean and in good condition; dirty or worn letters result in fuzzy and indistinct print. Good quality stencils protect the typewriter from becoming clogged with wax and have sufficiently sturdy backing sheets to counteract the effects of bumpy surfaces on a worn typewriter.

The method is cheap and simple, but has limitations:

1 The stencil wears out quickly. One stencil can be used to make up to 5,000 copies, but quality will start deteriorating long before this number is reached. Stencils can be used more than once, but second printings are always less good than first, and the quality deteriorates more quickly with each use.
2 It is impossible to reproduce well any solidly inked surfaces or any very fine lines.
3 Illustrations are limited to line drawings and patterns produced by styli, and further limited by the confidence and skill of the artist, who must draw or trace directly onto the stencil.

(b) Thermocopying. Artwork, including pictures if required, is prepared and then transferred to a stencil using a thermocopier. The process depends on the presence of carbon in all the material to be copied. The machine heats the artwork by infra-red heat. The carbon absorbs this, and spirit dyes are transferred on to the master sheet making a stencil. It is then duplicated in the normal way.

The thermocopying machine is inexpensive, but stencils made in this way do not reproduce details well and the process tends to fatten letters. However, the process is quick and easy, and makes possible the use of varied typefaces and plenty of illustrations.

(c) Electronic scanners. A stencil made with a scanner can be used on any duplicating machine. The artwork can be made up as required. The photo-cell in the scanner scans the artwork and cuts a tiny hole in the stencil whenever it registers black. Photographs can be scanned through a screen. Scanners can also be fitted with colour filters. They will make the three different stencils necessary to reproduce fully coloured copies.

The quality of print produced is better than by the other two methods, though the reproduction of photographs is only passable. Two sorts of stencils are available, carbon and plastic. The plastic stencils are more expensive, produce better copies and can make up to 8,000 copies each. The plastic stencils are more expensive than the metal plates used in offset litho. Though scanners are quite costly, there is still little capital expenditure involved in using this process. But for a great deal of high-quality printing, offset litho is probably a better investment.

5 Photocopying

This is printing using a photocopier. Any kind of original can be copied, and machines are available which reduce pages, reproduce photographs, copy in colour and print on both sides of the paper. It is a convenient method of reproduction, but uneconomical on a large scale. If you have an office photocopier and are producing only occasional sets of teaching materials in small quantities, then photocopying may be both practical and economical; you have control of the process and no extra capital outlay. Otherwise it makes little sense to use it as a printing resource.

SELECTING AND COMBINING DIFFERENT METHODS

Some important features of each of the methods discussed, except photocopying, are summarised in Figure 9.1. How you read it and the conclusions you draw from it depend on the money and manpower you have available, and the quantity and kind of printing you need to do.

If you want to prepare texts in large, clear print for people who cannot read well, offset=litho or letterpress printing together with electronic scanner stencils are the most suitable methods. If you require abundant illustrations, traditional stencils are no good, and letterpress is probably too dear. If there are photographs amongst the illustrations, offset-litho with metal plates is the best choice.

Good results can be achieved with cheap and basic equipment. Traditional stencils can produce attractive booklets, provided we use only simple drawings and are prepared to type new stencils when the old ones begin to deteriorate.

We can use more than one printing method in the same book. Pages with photographs can be printed by offset-litho from metal plates, while other pages are reproduced by a cheaper method. Outside printers can be used for the occasional specialised job, if our own equipment is limited.

PAPER

Printing paper is available in a range of standard sizes, and the quality and thickness of paper varies considerably. Paper is graded by weight measured in grams to the square metre - 80g per square metre is normally quite adequate for texts that are mainly words. If there are a lot of illustrations a slightly heavier paper may be needed so that the shadcw of the text does not show through against line drawings, or dark areas of photographs against the print. For stencil duplicating, we have to use duplicating paper. This is slightly absorbent to help the ink to dry. Cheap duplicating paper is better avoided as letters tend to come out with slightly fuzzy edges.

READABILITY AND TYPE STYLE

A fluent reader does not read each word individually, let alone each letter of each word. If you watch a person reading, his eyes will move across the page, occasionally moving back for a moment. He is seeing and absorbing whole phrases in a glance. When he looks back, he has temporarily lost the thread of what he is reading, or a point has puzzled him, so he is backtracking to find a point of reference. Occasionally he wants only to get the gist of a passage, and skims through without reading each individual word. Or if he is particularly interested he may deliberately read very slowly and attentively.

There are several implications of this for type style and layout. (2)

FIGURE 9.1 Features of different printing methods

	Good for long runs?	Good for short runs?	High quality reproduction of words?	Versatility in typographical possibilities?	Good for line drawings?	Good for photographs?	Big capital outlay?	Skilled technicians needed?	Labour intensive?
Letterpress	yes	no	yes	yes	OK (good but costly)	OK (good but costly)	yes	yes	yes
Offset-litho									
metal plates	yes	OK (expensive)	yes	yes	yes	yes	yes	yes	OK
paper plates	no	yes	OK	yes	yes	OK	yes	yes	OK
Screen printing	no	yes	OK	yes	yes	no	no	no	yes
Stencil duplicating:									
traditional stencils	no	yes	OK	no	OK	no	no	no	no
thermocopied stencils	OK	yes	OK	yes	yes	no	no	no	no
electronic scanner stencils	yes	yes	OK	yes	yes	OK	OK (but recurrent cost of plates can be high	no	no

OK indicates an answer somewhere between yes and no.

1 Letters must be easily distinguished from each other to allow rapid recognition.
2 Lines should be of such a length that they do not interrupt the rhythm of eye movements.
3 Any typographic features that might distract the eye should be avoided.
4 Typographic features can also be used to attract attention or as devices to slow the reader down.
5 New or poor readers will tend to mouth words or read them individually. Layout that conforms with the principles of readability will help them to gain more fluency.

TYPEFACE STYLE AND SIZE

Different styles of type are called typefaces. Many of those available are meant for display - for advertisements or ornament, where visual impact is more important than readability. Those used for books are relatively plain. A wide range is nevertheless available for use on typesetting machines or golf-ball typewriters.

It is better to choose a face with even letter formation. Some faces give a strong contrast between fine and thick lines in letters. This can make reading more difficult, not least because it is harder to produce fine quality printing from such letters: thick lines can become blotched and fine lines disappear. The letters should also have distinct ascenders and descenders. These are the tops and tails of letters like 't' and 'g'. These are quickly recognised and increase reading speed. They probably also help new readers to identify letters easily. A text that is printed entirely in capital letters has no ascenders or descenders and is therefore slow and difficult to read.

Some typefaces are 'sanserif', others 'serif'. 'Sanserif' type has plain letters without little tails, like this , while 'serif' type, as in this book, has tails. Figure 9.2 includes examples of both kinds. Both styles are equally easy to read. However, since most printed material is traditionally in serif print, it is possible that those who are used to serif print continue to find it slightly easier to read.

Most typefaces are available in at least three different styles. The commonest are 'medium' or 'roman', which is plain upright print, 'bold' which has thicker lines, so that it stands out well from the page, **like this** , and 'italic' which is a sloping version of the same face, *like this* . The latter two styles are often used for headings or for emphasis, as shown in Figure 9.2. Italic type always slows down reading speed considerably, and should be used sparingly. It can be used for answers to questions precisely because these should not be read too easily. Other uses might be to distinguish occasional foreign words or for book titles. For emphasis, bold type is useful. It does not actually slow down reading in the same way as italic, although there is some evidence that readers think it does. (3)

The size of type also matters. There are two widely used systems of measuring type sizes. The point system, generally used in the English-speaking world, is based on the 'point', a measurement

Self-assessment test B (Unit 4)

1. These types of questions are very straightforward providing you have good examples.

Stack you may have chosen the Needles as a group of stacks. A description must refer to their small area, sheer sides, and bare rock faces, and their formation is best explained in terms of attack upon a narrow headland, with caves being enlarged to arches, and following the collapse of the roof, the creation of a stack. They are therefore relatively short lived for waves continue to reduce them to mere reefs.

A text set in press Roman - a serif type. The text is 10 point, the heading in 11 point bold. The text is justified; this is from one of two columns set across an A4 page.

How to use the new maps

Scale

1:50,000 or approx. 1¼ in. to 1 mile (i.e. distances are shown half the size that they appear on the 2½ in. – 1:25,000 maps). The grid system remains unchanged.

Conventional Signs

These are largely unchanged but you need to be aware of the following:

Motorways are blue not red on new maps.

Woods are solid green and orchards white with green dots.

The contour intervals are no longer 50 ft: they should be carefully checked in each area (contours are liberally numbered).

A text set in univers - a sanserif type. The text is 10 point, and bold and italic faces are used for headings and subheadings. The text is unjustified; this is from one of two columns set across an A4 page.

How to use it – Activity 7

Now I'd like you to write a simple instruction showing someone how to operate a particular gadget. Let's assume that a friend is staying in your house while you are away. Write clear instructions telling him how to operate *one* of the following:

- Your cooker.
- Your hot water or central heating system.
- Your record player.
- Your TV.
- Your washing machine.
- Any other household gadget you have.

Take up to half an hour on this. Assume your friend is *reasonably* intelligent, but unfamiliar with the gadget!

A text set in 11 point press Roman - a larger type for a basic level text. Notice the big bold heading and the pen sign to indicate an activity. The text is set across about two thirds of an A4 page.

FIGURE 9.2 Examples of print, from National Extension College texts

of 0.351 millimetres. (The European 'Didot' system has a slightly larger point.) The size of type face is measured by the body of type needed to carry the letters. In 10 point size type the largest letters would fit on a block 10 points or 3.51 millimetres tall (the width being variable). So when we are talking about 10 point type, the standard referred to is the space covered vertically by the line of print, not the size of the letters themselves.

Ten point type is commonly used in books. It is comfortable for most people to read. Eleven and 12 point type are also suitable for ordinary texts, and may help those who are not habitual readers. Examples of 10 and 11 point type are included in Figure 9.2.

Most people can actually read text down to about 6 point, but there is seldom cause to use type smaller than 10 point. Avoid using tiny print for quotations or labels on diagrams; 9 or 8 point can be used if you really need to save space, but no smaller. If reading requires much effort, then understanding is likely to suffer. (4)

For fluent readers, 12 point type is probably the largest comfortable size. The flow of reading and pattern of eye movements can be interrupted if type is too large. But for new or poor readers, larger type may help to begin with. (5) Type as large as 24 point may be used for primary school readers. New readers need to be encouraged to read words in groups, so that only the most elementary books should use really large print.

THE ARRANGEMENT OF THE TEXT

A poorly arranged page can be off-putting or difficult to read. If lines are too short, the rhythm of reading is broken. If they are too long, we tend to lose our place from time to time as we move from the end of one line to the beginning of the next. A comfortable length is generally considered to be about 60 letters or ten to twelve words a line. For new readers we will probably use larger print and less words per line. We should try to break each line at the end of a phrase. This will encourage the reader to progress to reading sets of words as a group.

Spaces between lines need only be very narrow; usually only one point, or 0.351 mm, is added to the thin space already left between letters. Inexperienced readers are helped by a little more space, while lines of sanserif type need more interlinear space than serif. Large gaps between lines are to be avoided; they slow down reading.

Many books are printed in justified type. This means both the left and right hand sides of the print are in a straight line. While this is attractive to look at, unjustified type, with a ragged right hand margin, is easier to read, for three reasons. First, the unevenness helps a reader by holding his attention, just as the ascenders and descenders in lower case type make it more easily read than capital letters. Second, justified type can result in many words at the end of lines being hyphenated. This slows down reading. Third, to get the straight margin the spaces between words and letters within a line are adjusted. This frequently leads to white blobs or 'rivers' appearing across several lines, which can be distracting.

Punctuation needs care. Unnecessary punctuation should be avoided; for example, if you are using leaders dots thus, ...,three are sufficient. The point is that gaps in the print create 'hot spots' of white space which attract the eyes and so distract them from reading. One space only after punctuation marks, and between words, is sufficient.

Where numbers occur in sentences, it is better to write figures rather than words. These are quicker to read. In most books the convention is to write smaller numbers in words, but there is no strong argument for following this in teaching texts. For the numbering of exercises, points in a list, or diagrams, always use Arabic rather than Roman numerals. The latter are very difficult to recognise and always slow down reading speed.

PAGE DESIGN AND PREPARING ARTWORK

Many countries now use the international paper sizes. These all have the same width to height ratio. The most useful are A4 (210 by 297 mm) and A5 (148 by 210 mm). The A5 page is therefore exactly half the size of the A4 page.

An A5 size booklet is compact and easy to handle. Only a small amount of material is contained on each page, making it particularly acceptable to adult students unused to reading. The paper, if used 'portrait' with the shorter sides at top and bottom is also a convenient width; a line of print not exceeding 60 letters will fill the width without wasting margin space; A5 paper can equally well be used 'landscape', with the longer sides at top and bottom.

With A4 portrait pages we have to be careful not to make lines of print too long. We must leave a wide margin if we use smaller print sizes. It is possible to arrange the text in two columns, but this can result in a page that is dense and difficult to read. Another option is to use about two thirds of the page width for text, leaving a wide margin for notes or diagrams, as in Figure 9.3. This design may leave a large amount of paper blank, which can turn out costly. Occasionally, A4 paper is used landscape. This is particularly suitable for bilingual texts, such as those produced by Botswana Extension College (see Figure 7.3). Figure 9.4, part of a Spanish course for English adults, shows another possibility; one side of the page is used for a text and the other for vocabulary.

These recommendations relate to typesetting machines using 10 point type. With ordinary typewriters, there are some differences. As each letter is typed, the carriage moves on a set distance, making no adjustment for the width of letters. There are always a set number of letters to a set space, usually ten or twelve per inch (called 10 pitch or 12 pitch). The result is that letters take more space than typeset letters of the same height. The difference is not very great but means that even with a 12 pitch typewriter, lines on an A5 page have to be slightly less than 60 characters long. On the other hand, neither size leaves an over-large margin on A4 pages.

There is no evidence that any particular margin width, or indeed any margin at all, helps reading. However, a margin is obviously useful for notes, or for holding the book without covering the print

What advantage does each of the adaptations mentioned have?

Write here

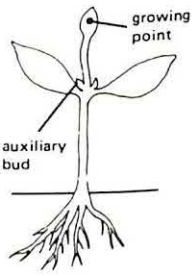
Fleshy fruits, e.g. cherry with its pulp and hardstone, gets eaten. The stone protects the seed on its trip through an animal. Large, fleshy fruits may provide a moist base to help germination to get started. Sticky fruits, e.g. goose grass hitch free rides on animal fur. Winged seeds, e.g. sycamore, glide away.

Why should they bother to travel? It's nice to stay home. – The parent plant must have been growing successfully.
Home already has an occupant. Mama is a large well established plant in command of water, light and space – it pays to leave even though there are risks.

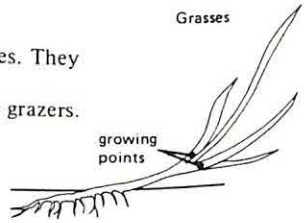
Plants don't adapt in isolation. Flowering plants could only have adapted as they did because there were birds and insects around. In some ways these animals were beneficial to the plants (pollination/seed dispersal)

What effect would grazing animals have on plant growth?
They would eat young tree seedlings – perhaps clearing open spaces. They would nibble the young growing tips of plants.
One result was the evolution grasses which adapted to life with grazers.

Most flowering plants



Grasses



What differences is the position of the growing point going to make to the growth of plants being grazed?

Write here

Nip off the tip of most flowering plants and there is a long pause in growth as they develop a new growing point or mobilise auxiliary ones (buds). Chew

FIGURE 9.3 Sample page - Ecology course (reduced from A4 original)

UNIT 7

7.1.a. Go through the dialogue several times in the usual way.

Hoy el Sr. Brown quiere alquilar un coche para ir a Sevilla a reunirse con unos colegas. Está en un garaje, donde habla con el dependiente.

Dependiente:	*Buenos días, señor. ¿En qué puedo servirle?*
Sr. Brown:	*Quisiera alquilar un coche para unos cuatro días.*
Dependiente:	*¿Qué tipo de coche quiere Vd., senor? Aquí los tenemos de todos los tipos.*
Sr. Brown:	Pues lo que me hace falta es uno de cinco plazas y de gran potencia, porque tengo muchos kilómetros que hacer.
Dependiente:	¿Prefiere uno de marca española, o extranjera?
Sr. Brown:	Bueno,a mí no me importa mucho. Lo que es importante es que sea potente y duro.
Dependiente:	Pues tengo este SEAT mil quinientos, que es un coche de cinco plazas por el que cobramos doscientas cincuenta pesetas al día, más cinco pesetas por kilómetro.
Sr. Brown:	A mí me parece un poquito caro. ¿No tiene algo un poco menos costoso?
Dependiente:	Lo siento señor, pero si le hacen falta cinco plazas, éste es el precio que tiene que pagar.
Sr. Brown:	Bueno, ¿cuánta gasolina consume?
Dependiente:	Pues, es un coche bastante económico. Consume unos diez litros cada cien kilómetros. Creo que es el coche que a Vd. le hace falta.
Sr. Brown:	Bueno, me decido por éste. ¿Puedo probarlo?
Dependiente:	Sí senor, ¿cómo no? Si quiere venir conmigo, vamos a arreglar los detalles, y después puede probar el coche.
Sr. Brown:	A propósito, ¿que hora tiene Vd.?
Dependiente:	Según mi reloj, faltan diez minutos para las once. Bueno, si quiere pasar por aquí . . .

7.1.c. **Cuestionario**

1. ¿Por qué quiere el Sr. Brown alquilar un coche?
2. ¿Qué tipo de coche quiere alquilar?
3. ¿Cuánto cuesta alquilar un SEAT mil quinientos?
4. ¿Cuándo puede probarlo el Sr. Brown?

7.2. **Revision Exercises**

7.2.a. Modify the sentences as appropriate.

e.g. Mi sombrero es blanco.
vestido. Mi vestido es blanco.
rojo. Mi vestido es rojo.

1. Now continue:
camisa

7.1.b. **Word List**

reunirse con	– to meet
el colega	– colleague
el dependiente	– clerk; assistant
quisiera	– I would like
me hace falta	– I need
de gran potencia	– very powerful
de cinco plazas	– with five seats
potente	– powerful
duro	– tough
cobrar	– to charge
caro	– expensive
costoso	– expensive
el precio	– price
la gasolina	– petrol
le hace falta	– you need
decidirse por	– to decide on
probar(ue)	– to try
como no	– of course
conmigo	– with me
arreglar los detalles	– to settle the details
a propósito	– by the way
faltan diez minutos para las once	– it's ten minutes to eleven

FIGURE 9.4 Sample page - Spanish language course (reduced from A4 original)

with your fingers. The width of a margin is therefore a matter for personal judgment. Printed pages should be thought of in pairs, as they are seen when the book is opened. Traditionally a page is arranged with its narrowest margin at the spine of the book and a wider margin at the outer edge. The margin at the top is a little wider still, while that at the bottom is the widest. Such an arrangement gives the text pleasing proportions.

The text is divided into paragraphs. These can be distinguished either by a small indentation (2 letter-widths) or a double space between lines. Both together are unnecessary.

Different typographical features can be used to draw attention to different kinds of information or activities. Headings using bold type can show a change of subject. A simple numbering system will direct learners through the text, indicate links between topics, and act as reference points. (6) Examples or exercises can be indented or surrounded by a line. Such devices should be used consistently. (7) Pages should look varied and interesting, but not so dense that they make students feel they are making only slow progress.

A picture or diagram must be placed right next to the text that refers to it, and to achieve this you may sometimes need to print the same illustration on more than one page. Maps or charts may be needed often for reference, and these can fold out from inside the back cover of a book. In some cases, a loose leaf enlargement of a picture is useful for display to a learning group. One can also have packs or wallets of pictures and other materials needed for frequent reference.

Pictures where appropriate and all diagrams or tables should have explanatory captions. Where there are several diagrams, reference numbers are also essential.

A little caution is necessary when using either coloured pages or coloured ink. It appears that black ink is usually faster to read than other dark colours. If coloured paper is used, it should be a light colour, such as pale blue or green. Occasional bright coloured inks or pages are likely to be memorable and attractive. It may sometimes be useful to print in two colours of ink, as the contrast will make selected points stand out.

PREPARING FOR PRINT

The text needs to be edited with the printing layout and method in mind. The material should be organised so that when the text appears on the printed page it looks attractive and is easy to read. This may involve minor reorganisation or substantial rewriting of parts of the text. The editor must also make sure that each illustration is a suitable size and in a form that will be reproduced reasonably well by the printing process to be used.

Laying out text well requires consistency and attention to detail. A list of conventions you will observe throughout, usually known as 'house rules', will help achieve this. Such a list should include detailed information on procedures under headings such as:

paragraphs
headings

quotations
italics
bold lettering
punctuation
numbers
lists
illustrations
format for exercises
format for answers

There will also be a variety of miscellaneous points, such as procedure for alternative spellings, abbreviations, footnotes, hyphenations or compound words.

Proof reading should be done with care. Preferably at least two different people should read the proofs independently, and the corrected version of the text should again be checked.

SUMMARY

Books, pamphlets, posters are meant to be read and understood. We should make sure that they can be, by a careful selection and use of printing resources. Typographic factors affect the readability of text. There are clear guidelines on selecting type style and size and on details of layout. Arranging whole pages is more difficult, but consideration of the intention of the text helps. Careful editing and preparation of the text, clear house rules and meticulous proof reading all help to produce a consistent and accurate publication.

Many of the points considered in this chapter have been matters of detail. Individually, they may be of little importance, but if several together are ignored, a text may fail to communicate well.

BACKGROUND READING

For printing, a useful guide is: Jonathan Zeitlyn, 'Print: How You Can Do It Yourself'.

For readability and text design, you will more detail in: Herbert Spencer, 'The Visible Word'; Patricia Wright, Presenting Technical Information; J. Hartley and P. Burnhill, 'Textbook Design: A Practical Guide'.

Making radio programmes

What can radio do? - How to make good programmes - Radio and other media - Obtaining feedback - Making sound cassettes - Summary

Radio can reach anyone easily. It can be cheap, so that on a large scale the cost of teaching each student may be low; even on a small scale radio is often cheap enough to be economical, so that programmes can be made for minority groups or isolated communities. Most things can be taught by radio. It is both portable and flexible: both president and peasant can speak into a microphone; programmes can be easily modified or changed, and broadcasters can respond immediately to topical demands.

Radio audiences are usually large. While it may be difficult to persuade people to listen regularly to a particular radio series, casual listening is generally substantial. In a recent survey in northern Nigeria, it was found that nearly half the farmers considered radio to be their primary source of information. (1) Similar findings have been reported elsewhere. (2) More surprising is the discovery that in Nicaragua nearly 20 per cent of the country's households listen to mathematics programmes intended for school children. (3) Radio ownership is still sporadic in some rural areas, but many people who do not own sets will listen to a friend's receiver. In the open air, it is easy to eavesdrop on a neighbour's set. (4)

There are, however, problems. Sometimes radio signals are weak or inaudible in rural areas. Some broadcasting authorities allow little time for education, and only at inconvenient hours. Rich stations may offer lavish programmes which draw audiences away from educational channels. ACPO in Colombia, for example, finds that local commercial stations draw people away from radio school programmes. (5)

Yet radio is effective. Combined with group study, it is a powerful catalyst for change. Radio gives the information, and group discussion helps people to decide to act. In a recent study comparing four Latin American communities, each with radio school groups, all villagers described radio as an important source of new information (only surpassed by the parish priest), while those who

were also members of study groups were more likely to have used the information to make changes in their lives. (6)

WHAT CAN RADIO DO?

Radio can help to sustain interest in a long-term project. It may be used to support teaching which is mainly conducted through other means, such as correspondence courses. (7) Students learn mainly from printed texts with written advice from their tutors, while radio programmes are used either to provide additional teaching or to give advice on study problems. Such programmes can provide encouragement to students and help them keep pace, although this is rather a doubtful advantage. Students who find themselves out of step with radio lessons can get discouraged. (8)

Sometimes teaching is done entirely by radio. If a project has a small and clearly defined aim, radio alone can be effective. Short programmes using techniques of advertising have persuaded some listeners in Nicaragua and the Philippines to adopt healthier diets. (9)

Frequently radio, print and group study are used together, each element having more or less equal importance. Radio study campaigns and radio schools use this combination. (10) Sometimes broadcasts simply give publicity to an educational project; a brief radio spot can attract thousands of learners.

HOW TO MAKE GOOD PROGRAMMES

1 Selecting which objectives are best met by radio

Where radio time is limited, or where radio is linked with other teaching, we should choose to use it for those things it can do best. Some examples are:

1 For giving information. Anyone, literate or not, can listen to radio, and information heard on radio is frequently highly valued.

2 As a stimulus for study, to create interest in a topic, or to stimulate discussion or reading.

3 As a support for study. A friendly voice reduces the isolation often experienced by distant learners.

4 To give news. Announcements of events or meetings related to study, or important developments or changes can be transmitted to learners immediately.

5 To give local colour. Brief discussions of local issues can be broadcast and the experience of learners in different regions can be reported.

6 To air different points of view. Discussions or interviews can present conflicting opinions.

7 To make a subject come alive. A dramatisation or a personal account of a situation can transform a dry topic into a live issue.

2 Planning a programme

For a small amount of information or for motivation alone, we may use short radio spots lasting a minute or two. The format of a radio spot is relatively easy to plan: a tune or 'headline' to draw attention, followed by a brief message presented in song, a snatch of dialogue or a straightforward announcement, with perhaps a brief repetition of the main point to finish with.

A typical example is this road safety radio spot devised by the Lesotho Distance Teaching Centre: (11)

5 seconds: Attention: Hooter, loud, sharp
25 seconds: DRAMA: one of several recorded.
5 seconds: Message: 'When you drink don't drive, when you drive don't drink.'

For longer programmes, it is reassuring to know that listeners generally remember well the main points presented. They are likely to remember better points at the beginning and end of a programme. (12) However, people can only learn a limited amount at any one time. A programme needs to be divided into short segments, so that one point at a time is taught. Each programme should only contain a small number of ideas.

A varied programme will command closer attention. If a broadcast is monotonous, people soon start listening selectively (13) picking out points of particular interest and missing others. Changes of style are needed, but not frivolous interludes.

3 Styles of presentation

Stories, dramas and accounts of personal experience are popular with adult listeners, especially those who have had little education. (14) People also recall points made in a drama more readily than when they have been presented in a talk. But more important than style is the subject matter. If a listener is interested in learning about a particular topic, style matters little.

However, one experiment shows how people can be persuaded by radio to take an interest in quite new ideas. A number of people listened to an episode of the popular British soap opera, 'The Archers', 'an everyday story of country folk', in which a key character visited a mental hospital and decided to submit himself for voluntary treatment. Afterwards, the audience showed a 'general trend ... towards greater confidence in the work of mental hospitals and a clearer understanding of what they are doing'. The research concluded that 'it is possible to use a familiar and popular form of presentation to communicate fairly difficult and possibly unwelcome ideas ... to an audience which would otherwise be unlikely to seek out such information for themselves.' (15)

Some students feel dramatic presentations lack seriousness. Correspondence course students in Lesotho studying for secondary level qualifications disliked lively dramatic radio programmes and wanted to be taught by lectures. Other students whose purpose is serious may be similarly puzzled or distressed by apparently lightweight radio programmes. Unfortunately, lectures are a wasteful way of using radio, as it is difficult to concentrate on a prolonged talk with no visual interest.

Drama is effective partly because it can set problems in a familiar context. Drama may be broadcast from a studio or, since recording equipment is mobile, groups of learners can themselves present a performance. You can suggest a theme to a group, ask them to act out their responses, and record the results. Such plays accurately reflect the issues the people themselves see as important.

Learners may also plan and make their own programmes, without the prompting of a producer. Members of the radio schools of 'Radio Mensaje' regularly make their own programmes, which expose the issues that matter to listeners and reflect their local culture. These programmes were experimental at first, but quickly became so popular that more air time was given to them. (16) Programmes are made from material recorded in villages and edited at the radio station. Up to 40 village groups are loaned tape recorders and send in their own choice of recordings. The programmes appeal to an audience very much larger than the few village groups participating. (17)

Where programmes consist of formal teaching, imagination is needed to plan programmes which hold the listeners' interest. One possibility is to mix different levels in one programme, as in Radio Santa Maria's primary equivalence course for adults. Students at one level listen for seven minutes then turn their radios down while they write exercises. Meanwhile, the second group listen to the section at their level. The first students turn up the volume again when they hear a signal tune. (18)

Some subjects can be taught by a 'listen and do' approach. Primary school children learning maths by radio in Nicaragua must give active responses to radio questions about three times a minute. This method is so effective that the children are gaining a better understanding of maths than their contemporaries taught by conventional means. (19) Several Latin American radio schools ask their adult students to write things down in their workbooks as they listen to the programmes. This holds their attention and helps them learn more effectively.

Most programmes will consist largely of instruction, even if it is presented as drama or in another informal style. However, programmes or items of general support, such as news, local colour or advice on studying, will help distance learners. In Botswana, a general 'question and answer' programme 'Re Botseng' was a popular success. A 30-minute programme was broadcast weekly, answering listeners' letters on all kinds of topics of general and national interest. (20)

Radio programmes can include a local element where printed materials are centrally produced, and this may stimulate people to relate topics to their own experience. Regional stations can broadcast their own programmes, in local languages, or a national programme can contain contributions from different districts. Recordings made in one region are often as interesting to other listeners as centrally produced programmes, since listeners can compare their experience with that of other communities.

4 Making programmes easy to listen to

The language of broadcasts should be as simple and clear as that used in texts. Although speech is more easily understood than print, it still helps to talk directly, to avoid unusual vocabulary, and to use simple sentence structures. (21)

A broadcaster needs to talk slowly. On one occasion a radio lecturer in Tanzania was amongst the audience listening to a programme he had made. The weather was stormy, the radio signal was weak, and the talk was hard to hear, but people were listening carefully. Then the radio gave out. The lecturer continued the talk himself, word for word. He could see alertness increasing on the faces of the listeners. They were understanding the live talk better. The broadcast talk should have been simpler and slower.

We should probably talk at about three-quarters our normal speed. In Uganda some years ago a number of adults, mainly teachers, followed a series of programmes broadcast in English. When the numbers of words per minute was reduced from 170 (slightly slower than ordinary conversation) to 150, they understood much more, although some listeners still had some difficulty. The study recommended a speed of 130 words per minute. (22)

If a broadcast is in the second language of listeners, they need sufficient time to recognise unfamiliar sounds. Different languages have different shades of distinction between sounds. English, like many other languages, distinguishes between the two hissing sounds 's' and 'sh' as in 'soul' and 'shoal'. Spanish, however, has only one sound of this sort, which may be pronounced somewhere between the two English sounds. Spanish speakers may find it hard to distinguish this difference in English pronounciation in rapid speech. Such distinctions, when they do not exist in your own language, are difficult to hear at all, and certain words may be ambiguous. (23)

The stress, tone and rhythm of speech help understanding. The origin and accent of the speaker is therefore relevant. If people are listening to a language that they do not know well, they may understand better if the speaker comes from their region. In West Africa, for example, a West African speaking English may be better understood than someone from England.

Radio is personal, more so than print. It is much easier to relate to a voice, even a disembodied one, than to a word on a piece of paper. Writers have to make efforts to make themselves seem real to readers, whereas broadcasters project a picture of themselves through their tone of voice, their accent and their speech mannerisms. This intimate feeling can be reinforced by using two presenters. At Acción Cultural Popular Hondureña, a radio school in Honduras, a man and a woman present programmes together. Each takes turns to be 'teacher' and 'learner' so that the students listen to a dialogue which reflects their own thought processes. (24)

The sound needs to be of good quality, especially where reception may be poor or variable. Broadcasters should have good, clear voices, and sound effects that can easily become distorted and incomprehensible should be avoided. (25)

Sound effects are in any case open to misinterpretation.

Research conducted in Kenya with schoolchildren and their teachers revealed that many apparently straightforward sounds were widely misinterpreted by teachers as well as children. (26) Those that were best understood were a train with a whistle and a cow lowing. But even here about a tenth of the children misunderstood the sounds, while most of the teachers recognised the train, but half failed to recognise the cow's moo. Moreover, on the whole test, hardly a person gave no answer at all. The sounds were giving people mental pictures, but the wrong ones. The most interesting result was over the roar of a lion. The experimenters thought wrongly that this would be a familiar sound to rural Kenyans. Hardly any knew what it was; those who did were a wealthier group of children living in the city, who had television sets at home and had learnt what a lion sounded like from those. In this experiment, the sound effects were isolated, and so extra difficult to recognise. However, the difficulty experienced by listeners was so great that we must conclude that sound effects should always be used with care.

RADIO AND OTHER MEDIA

If learners must refer to other materials during a programme, these should be closely matched to the broadcast. When listeners look at pictures in a booklet or flipchart, the discussion on radio must match the picture accurately. (27) The Open University in Britain has found that radio programmes that refer closely to visuals in correspondence texts are much more effective than programmes that simply talk about a lesson. (28) A printed summary of main points is a useful accompaniment to programmes designed to stimulate discussion afterwards. Canadian farm forum groups, for example, received summary notes and discussion questions for each broadcast.

OBTAINING FEEDBACK

Audience reactions can be made use of immediately to change or improve programmes. Even tapes recorded in advance of transmission can be edited at the last minute. Feedback is ensured if listeners are expected to submit written work as part of their study. If this is not the case, reactions are still easy to gather. People everywhere have a habit of writing to radio programmes, whether or not comments are requested. Such letters can be assessed, and reactions on a particular aspect of broadcasts can be invited over the air, or perhaps in newspapers.

A random survey of possible listeners can measure the effectiveness of a series or campaign. If you conduct a survey of knowledge on the topic before and during the campaign, and include non-listeners as well as listeners, you may be able to see whether listeners have passed on information to people who have not heard the programmes. (29)

It is possibly more efficient and rewarding to look for feedback after transmission rather than to carry out extensive testing before it. While such testing can be useful, the nature of radio is such that it is simple and cheap to monitor and change programmes as you

go. It may, however, be helpful to try out bits of programmes on tape, or test a radio script with readers as if it were a written lesson.

MAKING SOUND CASSETTES

Sometimes radio programmes are also made available on tape. For example, those trainee teachers in Tanzania who cannot pick up the radio signals well are sent cassettes of the programmes included in their course.

Materials intended solely for distribution on cassette should be prepared along much the same lines as radio. They should, however, make use of the advantages offered by tapes. A recording can be stopped and started at will, and sections can be played more than once. Space can easily be left for learners to think over a point, or repeat a phrase, and this makes tapes particularly useful for the learning of languages. Students may be able to send their own recordings to their tutors. Cassettes are, of course, a life-line for blind students as a substitute for printed materials.

Tapes are also useful on a small scale as a supplement to centrally produced broadcasts or print. Groups of farmers, for example, may be studying irrigation techniques and want to know more about those that suit their local conditions. The general principles can be explained in materials for everyone, while a number of different cassettes could discuss problems particular to each region.

Compared with radio, there are disadvantages in using tape recordings. While recorders are no more difficult to distribute than radio sets, each cassette has to be bought, copied and distributed. This is costly, and cassettes are therefore better employed on a small scale.

SUMMARY

Programmes should be carefully planned, so that they are varied and lively. Stories, dramas and accounts of personal experience are particularly popular, and an appealing programme can persuade people to accept even unwelcome ideas. Programmes where listeners themselves take part are likely to reflect the interests of the community. Regional items can be included in programmes to increase their impact.

Language needs to be simple and clear, and presenters should speak slowly. Sound effects should be used with caution, especially where there may be reception difficulties.

Additional teaching materials are more effective if they are closely linked to broadcasts. Support materials are generally useful, even if they consist only of brief notes.

Programmes are easy to modify, so that rapid collection and analysis of feedback is valuable. Little effort is required to collect reactions from listeners, though more controlled research is required to measure accurately the effectiveness of programmes.

Cassettes are free from the time constraints of radio: they can

be stopped or played back, and students can record their own responses. They are expensive to use on a large scale but a useful alternative to radio for a limited audience.

BACKGROUND READING

There are a number of useful publications on radio for nonformal education. Two short background publications are: Emile McAnany, 'Radio's Role in Development'; International Extension College, 'Seeking the Barefoot Technologist'. Three companion volumes contain more detail: Peter Spain et al. (eds), 'Radio for Education and Development: Case Studies' (2 vols); Dean T. Jamison and Emile McAnany, 'Radio for Education and Development'. For an account of adults learning from radio: Joseph Trenaman, 'Communication and Comprehension'.

For practical ideas on planning and organising programmes (listed the shortest first): James Theroux, 'Quality in Instructional Radio'; Richard Burke, 'The Use of Radio and Adult Literacy Education'; Brian W.W. Welsh, 'A Handbook for Scriptwriters of Adult Education Broadcasts'.

Making films and television programmes

Why choose film? - How to plan a good film - Making a film easy to understand - Making a film easy to learn from - The sound track - Assessing effectiveness - Summary

Moving pictures can show things in a way which mirrors reality, accurately and selectively. We can see things we could not see otherwise - events that have happened far away, processes invisible to the naked eye, or partially concealed by the length of time they take to happen.

Films can reach large numbers of people. They can be broadcast on television or projected before an audience. Even without cinema buildings or television transmission networks, mobile film vans can give film shows before audiences of several thousand each month. (1)

Drawbacks are that both films and television programmes are expensive to make and distribute. With television, there is the problem of ensuring that those for whom programmes are intended have access to receivers that work; and with film, the copy and the projection equipment have to be taken to the audience. To help people learn, film is better used in co-ordination with supporting material or discussion groups. These difficulties mean that neither medium is chosen lightly for education.

WHY CHOOSE FILM?

We are most likely to use films if our topic is of wide interest or if it is difficult to present well in any other way. As far as the medium itself is concerned, radio and print can communicate as effectively as films. (2) We need to have strong reasons for choosing moving pictures instead. What are the characteristics of film that might influence our choice?

1 It gives a clear representation of reality. Film can document events and processes, show the connections between them and give a rounded picture of a subject. It thus encourages rapid and thorough understanding of a topic. Film can show well processes that take place over time, such as life cycles of plants or animals.

It can show what goes on in different places, such as the relationship between town and countryside. It can show things normally invisible or hard to see, such as parasites in the human body, tooth decay, or the life cycle and activities of crop pests.

2 It can demonstrate activities. If an activity is simple enough to remember and copy from one demonstration, it can be taught by film. Practical skills, such as carpentry techniques, can be taught like this. But when an activity is complex and involves a number of stages, it cannot be taught well by film alone. (3) Film may also sometimes be clearer than a live demonstration, as in medical education, where a film can show the hands of a surgeon and follow his actions in detail.

3 It can motivate, often as a result of a strong emotional impact. A film of a child suffering from malnutrition may make more impression on mothers with children at risk than a single picture; or a film presenting sharply contrasted points of view on a controversial issue may prompt viewers to question their uncritical acceptance of their own beliefs and principles.

4 It is highly memorable. In general, people enjoy watching films and pay close attention to them. Strong visual images are not easily forgotten. Moreover memory of a particular image or film sequence can act as a cue for the recall of other connected material.

HOW TO PLAN A GOOD FILM

In nonformal education, film is generally used to support other media, to meet selected objectives. In an animal husbandry project we may use film only for the practical demonstration of techniques of animal care; in a literacy project, the aim of films may be limited to motivating the learners. We have also to decide what kind of objectives to concentrate on in each film. A film that is intended to evoke strong feelings should not normally attempt to teach numerous facts as well.

We should limit the number of ideas presented, and make sure that the structure is well defined. In order to hold the viewers' attention, films should have a straightforward line of development, which is easy to follow. They should proceed fairly slowly, giving time for digesting each point. The best liked films are frequently short, dealing with a single concept.

Films can contain documentary, drama, animation or discussion. In selecting a style, we should start by considering the subject matter and the audience for whom the film is intended. The more abstract the ideas involved, the greater the need to take compensatory action in making the film more concrete. Films that dramatise a subject, or present it in a way that brings out important human factors, are effective, particularly for those with little formal education. On the other hand, if anyone is strongly interested in a subject, he will attend carefully even to a relatively lifeless, impersonal presentation. For example, an apparently dull film about an agricultural pest is one of the most popular with East African farmers. (4)

The style must, however, suit the expectations of viewers.

People sometimes feel that lively presentations do not have a serious educational purpose. Rural viewers in India disliked some television dramas that seemed to exaggerate (5) and adult literacy students in Britain reacted against cartoons in their television lessons, saying they were childish. (6)

Film style and content must also match the culture of the audience. The appearance of recognisable everyday things will help viewers relate to a film. Details are often noticed and appreciated, such as a family eating local foodstuffs. (7) An incorrect detail, on the other hand, may make a sequence unacceptable. A film made in Nigeria included a sequence on how to bath a baby. When this was shown to some Ugandan women, they did not like it because the child's head was washed last. Local custom held that the head should be washed first. (8) A film can also offend by disregarding local conventions of interpersonal communications. In many societies it is a sign of respect to avoid looking straight at someone, while television presenters conventionally look viewers in the face. Viewers can at first find this disturbing. (9)

A recent Nigerian film, 'My Brother's Children', set out to gain approval for family planning amongst people in the Yoruba region. (10) The story was easy to follow, but a large proportion of viewers, particularly those from the country, missed the point of the film and ended by expressing disapproval of the ideas.

The story of the film was presented in the form of a traditional drama, acted by a well-known troupe. Nigerians expect this style of drama to be didactic, so the audience would be ready to learn from the film. An urban couple with a small family were the central characters. The husband had a brother in the country, who had several children, and decided to send one to live with his urban brother. The city wife objected to this, arguing that the country brother had no right to depend on them for help and instead should pay attention to limiting his family.

The story stressed the misfortunes that come from having many children rather than the benefits of having few, a negative rather than a positive theme. The line of the story also ran counter to traditional practice, which expects a prosperous member of a family to help relatives who are less well off. The film therefore required its audience to change its attitude towards an accepted practice. Although the story was told with sensitivity towards cultural traditions, certain details in the behaviour of some of the characters were criticised and so added weight to the arguments of those who were already inclined to disapprove. For example, the city wife lost her temper over the question of her nephew's arrival: this was unacceptable behaviour in a wife. And at a marriage ceremony an elder was seen giving the bride advice on her future life, whereas his traditional role was simply to give a blessing. Both these minor incidents in the film were picked out and discussed by rural viewers, and added to their disapproval of the story. The result was that many identified with the village man, the 'culprit', and thought that his urban brother was in the wrong. (11)

It is difficult to assess what weight to put on such cultural factors. In what circumstances are they likely to tip the balance between acceptance and rejection of a point of view?

Probably if there is strong interest in the subject and clear

benefits to be obtained from change, then cultural mistakes will make little difference. If, however, the film presents relatively unattractive ideas, details may make the difference between acceptance and rejection.

MAKING A FILM EASY TO UNDERSTAND

While moving pictures should generally be composed along the same lines as still ones, people with little experience of any pictorial matter seem to understand films quite easily. This is hardly surprising. People use familiar objects and details in pictures to help them understand the image. A sequence of moving pictures provides a continuous series of such clues, so that recognition becomes easier.

There is some evidence that people from remote rural areas have more difficulty in comprehending films than others. A recent study in Tanzania found that such people sometimes failed to understand films while those living in the country near cities understood very well; even if individuals had not been to the city, they seemed to benefit from the second-hand experience of those who had. (12) But if serious difficulties of understanding occur, it is likely to be due to a poor choice or arrangement of subject matter. We can, nevertheless, take steps to make pictures and presentation clearer.

1 Images should be clear and straightforward

Sophisticated camera techniques need to be used with caution. A gradual movement from looking at a whole object to a close-up of part of it can be effective, the movement of the camera itself explaining that the final picture is an enlargement. But abrupt changes of camera angle, of time or of place can confuse viewers.

In 1975 viewers in some regions of India were due to receive educational television programmes by satellite. In preparation, films were shown to some villagers who were illiterate and had never seen a film. One, about family planning, showed a bride, who at one point imagined herself in the future burdened with too many children. Few understood what was happening. (13) In another film, a presenter introduced a report of a fair. Most viewers thought the man was speaking from the fair, and very few realised he was introducing an event that had already occurred. (14) A picture behind or alongside a presenter can give greater credibility to her report (15) but it is clear that she should refer to the picture and explain it, for the benefit of inexperienced viewers.

Animation techniques, even when used sparingly, can be confusing. One Kenyan film showed a star issuing from the mouth of a satisfied gourmet, which provoked the comment: 'What's that thing coming out of his mouth? Every time I see this film I ask my friends what it is - is he spitting something out, or what?' (16) One of the films shown in rural India was a cartoon on family planning. Not only did the intended humour fall flat, but also less than half of the viewers realised the characters were caricatures. (17) Other accounts of cartoons misfiring include a showing of a Donald Duck

film where the audience found it offensive to see a bird aping a man, and a speeded-up cartoon of a latrine being built which turned out to be incomprehensible rather than humourously instructive. (18) Animation techniques are probably best reserved for topics, such as biological explanations, which can best be explained this way. (19)

2 The choice of presenter is important

If a film has a presenter, his or her personality has an impact. People will listen more carefully if they like the presenter. Professional producers sometimes overlook this and choose a presenter with polish and style rather than credibility. Audiences prefer someone with whom they can easily identify. In a recent series of television programmes for British trade unionists, the presenters were trade unionists and not television professionals. Most viewers who were asked about the programmes felt that these presenters were much better than professional ones. Some viewers expressed distrust of professionals: 'If they want to put a thing over, they can more or less convince you while you're sitting listening'. (20) They preferred watching someone whose interests were clearly close to their own.

3 The sound track needs to be clear

The commentary must be co-ordinated with the pictures. This is sometimes difficult when the original sound track is in one language and another is dubbed on, perhaps with additional explanations. It is often more effective to show a film without sound and provide the projectionist or an assistant with a commentary in the local language to read aloud. Sound and picture can thus be accurately co-ordinated and the reader can watch audience reactions and explain or amend points on the spot or after the showing. (21) Music or sound effects should be used with caution. Both can be distracting (22) while music must be chosen to suit local taste (23) and sound effects are easily misunderstood.

4 Is colour helpful?

Research in several countries has established that colour in educational films does not contribute to greater understanding. A colour film can, however, invoke a particularly strong emotional response amongst viewers. (24) But investigations on this question are inadequate for nonformal education in developing countries. Black and white films may usually be sufficient, but where the detail in pictures is important, lack of colour could sometimes act as an impediment. Traditional herdsmen might disregard a black and white film on cattle. Their knowledge of cattle is so intimate that lack of colour risks turning the pictures into an abstraction for them. There may be a stronger case for colour in films for people with little educational experience than is generally thought. (25)

MAKING A FILM EASY TO LEARN FROM

Individuals have different learning preferences. Some of us attend better to words, others to pictures, some to details, others to things as a whole. Film caters for each of these preferences and, as it compresses different aspects of a theme into a coherent whole, it helps viewers to understand a topic thoroughly. It is also likely to be thought true. (26)

But viewers are easily distracted. An irrelevant movement on the screen, such as an animal crossing the foreground, can attract attention. More seriously, an interesting segment of film used merely as an example can attract all the attention to the detriment of the main theme. A film for training teachers of social science showed briefly a clash between students and police in order to stimulate discussion about selective perception - how police and student viewers might perceive that event differently. But the powerful visual material distracted viewers into a discussion on the rights and wrongs of student demonstrations. (27)

Adult learners tend to make snap judgments about films, and they will go away or turn off the television set if the start of a film disappoints them. Rural audiences in Kenya make no attempt to absorb any information from a film, if it gives the impression it is primarily entertainment. But if they decide it is educational, they make every effort to understand and retain the content. (28) Sometimes straightforward, even dull, films appeal more to learners than lively ones. Some Ugandans studying letter-writing techniques in the 1960s preferred to learn from serious, straightforward television programmes rather than entertaining and varied ones, (29) while teachers in Colombia studying with the Universidad Abierta de Javeriana were irritated by entertainment breaks in their television programmes. (30)

A film can contain a number of points and yet be easy to remember. When film and sound presentations on the same topic are compared, there is generally a greater density of facts in the film. One investigation revealed that television contained an average of 11 major points in the first ten minutes, more than corresponding radio talks. The difference is largely due to the medium. The camera moves on from one thing to another, so that points are developed only briefly: (31)

> In sound broadcasting or the printed word such items would have formed part of a general discussion. In television each illustration had to be seen long enough to enable the viewer to assimilate it, so that it acquired an importance it did not really require in the development of the theme.

Viewers who are used to television are not distracted or confused by such density, and understand and remember film as clearly as the same material presented in print or on radio.

Film by itself, however, has limitations. Watching a film is a passive process. The audience is usually physically relaxed, even if mentally excited. A film demands all the viewer's attention; she is unable to stop it, to repeat a bit of it, or to take notes while she watches. She will learn more if the film can stimulate a more active response. (32) We may repeat or summarise points, perhaps in a different way from before. People learn most from the

first few minutes of a presentation, and least from the middle, so that repetition may usefully occur in the later part of a film. (33) Questions in the commentary can stimulate thinking, although we must be careful not to distract viewers from what follows. Better still, we may arrange activities to support a film. As with radio, printed material can be provided or group discussions arranged.

THE SOUND TRACK

There are two kinds of educational film. The first is an illustrated talk, where background pictures or film excerpts are used to add interest and depth to a presentation depending mainly on words. The second is a film with a commentary, where the visual components are as much part of the fabric as the words. Usually more time and effortare spent on composing the pictures than the sound and it is therefore easy to assume that the pictures are the main vehicle of communication.

How important are the words? When Joseph Trenaman compared the comprehension of radio and television programmes and printed lectures, he found no significant difference between the media, and he therefore concluded that common factors shared by the media accounted largely for this. The visual part of a television programme is probably less important than the spoken part: (34)

> even when it is using its visual capacities to the full, television must still rely on language to communicate very much of the meaning of what is seen. And the moment the subject moves away from what is immediately perceived, we are entering the field of ideas conveyed through language.

We cannot rely entirely on pictures to communicate. (35) Pictures and sound are complementary.

The level of language in a commentary poses little difficulty. Speakers must use short sentences and direct language in order to keep up with the flow of pictures. If a commentary is genuinely complementing pictures, it is unlikely to be too dense or difficult. (36)

ASSESSING EFFECTIVENESS

Printed materials and radio programmes are relatively easy to draft, test and change before final production. Trial versions of films are expensive to make so that changes are always costly and sometimes impossible. It is therefore generally necessary to restrict testing to the minimum.

In circumstances where film is relatively unknown and is going to be used a great deal, it is advisable to test the understanding of visual language along lines such as those used before the Indian satellite experiment. Alternatively, we may simply assume that film conventions will not be understood and avoid them or explain them as they are used for the first time. This is quicker and cheaper.

The story or argument of a film can be tested in print or sound before the film is made. A photo-booklet, a demonstration or a

play can be used to assess comprehension and attitude. This method has advantages. Showing people a film can be deceptive, as viewers sometimes like films that they do not understand very well. (37)

Some argue that it is impractical to test films, on grounds of cost and difficulty. (38) Others argue that testing and revision can make a major difference to effectiveness. (39) We must decide if we have the will, time, money and manpower to remake a film if it proves to need it. If our answer on any of these counts is negative, then testing a film, once made, is pointless. We can, however, monitor audience reactions in order to help with later productions. (40)

SUMMARY

Our use of film or television is likely to be selective. Moving pictures are particularly good at documenting events and processes, at demonstrating activities, at arousing strong feelings, and at stimulating the memory. We will usually choose film where one of these aims is uppermost. Films are best made round a single theme. Several styles of presentation are satisfactory, the best being the least abstract. Animation techniques should always be used sparingly. Care should be taken to include material that gives some local flavour to the film, and this should be done without upsetting cultural norms.

People generally have little difficulty in following and understanding films. Both commentary and pictures are important. Where the audience is likely to have little experience of moving pictures, we should avoid fancy camera techniques. It helps if the presenter is someone to whom the viewers can easily relate. The sound track should be linked to pictures actually on the screen. Black and white films are usually adequate, but colour may sometimes be needed. A well-structured film will of itself stimulate some learning, but follow-up activities are needed to reinforce this.

BACKGROUND READING

On television or film for nonformal education, two short articles: James Potts and Tony Troughear, On the Road Again; Jock Gunter, NFE-TV: Television and nonformal education. More detail is available in: Andreas Fuglesang (ed.), 'Film-making in Developing Countries'; Jonathan Forrest Gunter, 'NFE-TV: Television and Nonformal Education'; R.F. Arnove (ed.), 'Educational Television'. Much advice on the presentation of films is included in On the Road Again and 'Film-making'; an additional useful source is: Wilbur Schramm (ed.), 'Quality in Instructional Television'. This book also contains discussion of evaluation and testing.

Chapter 12

Approaching number

The range and characteristics of traditional maths - Teaching maths at a distance - Guidelines for action - Finding out if it works - Summary

Numeracy is an integral part of all basic education. Concepts of time, distance, weight or price appear throughout materials concerned with practical skills. This chapter considers the presentation of such mathematical content.

Difficulties occur in working with number and measure in different cultures. The underlying problem concerns the extent to which their use is restricted in different places. We may distinguish four main problems in the handling of these concepts:

1 There may be a limited need for, and therefore a restricted use of, number. Where, for example, there is limited trade and exchange, there may be little demand for calculations in everyday life.

2 Systems of notation may differ. Some systems of recording numbers make calculations awkward: it is difficult, for example, to multiply CCLXXXIV by XXXIX - indeed the ancient Romans did not get very far with the mathematics of number.

3 Methods of calculation differ. Writing numerals is an aid to calculation. Another is the abacus, which makes many operations easier. Another is finger-counting, which is helpful with small numbers but of less use with large ones.

4 Different standards may be used for measurement. The metre, the yard and the pace are all measures of length. A metre or yard is related to a standard which, once understood, can be easily used for calculation. The pace is less precise, relying on mutual agreement on a standard in each case.

These differences result in gaps between traditional systems of number use, or aspects of them, and international usage. While it is not possible to say precisely what problems these differences will cause, we can predict where difficulties might occur, and take steps to overcome them. As the first step towards this, let us look in more detail at some characteristic features of restricted maths systems traditional to various groups.

THE RANGE AND CHARACTERISTICS OF TRADITIONAL MATHS

Recent observation of shopping in Lesotho illustrates a restricted use of number. Some shoppers would buy one item - a tin of beans, say - pay, take the change and then buy a further tin. They preferred to do each transaction separately. (1) They could only partially understand and use number: they could perform one financial transaction but, in this context, they seemed to have no notion of multiplication or addition, the operations needed to calculate the cost of two similar items.

Partial understanding of some aspects of mathematics does not, however, necessarily mean an inadequate grasp of others. There are indeed a number of concepts and operations basic to an understanding of maths and, moreover, the subject is hierarchical - with understanding of one idea frequently depending on the prior understanding of another. But people may develop their understanding unevenly. One group of people may be highly skilled in the maths of trade and exchange; another group, gamblers for example, may be excellent at estimating probabilities; money changers and bankers are quick to calculate exchange and interest rates. Such skills may be developed because of specific occupational requirements or they may be shared by all members of a culture.

The language and conventions of number frequently develop erratically. Systems may contain peculiarities in terminology and measurement, often left over from an earlier age, such as the English measures of quantity, gross, score and dozen (144, 20 and 12). You need to know in what circumstances these are the only correct measures to use. Until very recently in England, for example, screws were always purchased by the gross, while eggs are still bought by the dozen. Such anomalies can probably be found everywhere. It is essential for teachers to understand local numbering and measuring systems. (2)

1 Number systems

The words used for numbers in any language will tell a great deal about the number system. In some languages words do not exist for numbers themselves. You can say 'five pots' or 'the fifth pot' but not 'five' on its own. This indicates that counting may still be closely linked to the objects counted, and people without formal schooling may have difficulty in handling numbers abstractly.

Sometimes important articles have their own number words. In the north of England a set of number words used only for counting sheep was until recently still in use. On the other hand, in many parts of Africa, it is traditionally considered to bring bad luck to count people or animals explicitly, and alternative methods have been devised. The Nigerian novelist Chinua Achebe describes how the Igbo people used the annual yam feast as a census mechanism. Each person presented a yam, and that way numbers were known without counting people directly. (3) Or a language may contain a number of words to describe animals with different markings; Jomo Kenyatta described in his autobiography how Gikuyu boys were taught to count herds of cattle by observing their coloration. (4)

Sometimes a particular number is strongly associated with good or bad luck. Seven, for example, denotes bad luck in many parts of Africa: (5)

> A school child, confronted with the arithmetic problem: 'A man has eaten seven fishes. If he eats three more, how many will he have eaten?' might very well respond: 'He'll be dead by tomorrow for eating an unlucky number.'

Habits of counting can affect ability to estimate. If you regularly use stones as aids to calculations, you may become very good at estimating the number of pebbles in a heap, while you will be poor at estimating the number of houses or people in a village. (6)

Tools to assist counting and calculation include the abacus and the tally stick. An unusual tool was the 'quipu' used in the ancient Inca civilisations: knots were tied in a set of strings in a systematic but complicated notation system. Often the human body is used to help with counting. Most African counting systems derive from finger-counting, which is still widely used. Even large numbers can be expressed simply by using the appropriate conventions. Systems vary from district to district, though throughout East Africa a standard system has been developed for trade purposes. Names of numbers often derive from finger-counting. In Lesotho until recently the standard word for 99 meant 'tens which bend one finger which have units which bend one finger' though this has now been replaced by 'tens nine with a root that is nine'. (7)

The most common groupings of numbers are five, ten and twenty. Sometimes, though, old currency systems used strings of beads or shells in lots of forty or sixty, and transactions still take place using these numbers. People learn to calculate quickly and efficiently using such awkward numbers although complex operations are cumbersome and lengthy.

In many languages, there are no native words for precise fractions. In Swahili, for example, Arabic words are used. In the West African Kpelle language, the word used for a half denotes one of two parts of a whole; it does not contain a notion of equality. (8) There are no words in that language for other fractions. Words that denote numbers often, therefore, give quite clear indications of the way number is traditionally used in a society. An investigation of the range and meanings of such words is a useful first stage in the design of numeracy materials.

2 Measuring systems

There exist in every culture standards for measuring the length, weight or volume of important commodities and objects. These range from those set by national or international agreement to measures agreed on in each situation. In Lesotho the pace 'leoto' is traditionally used for measuring area, and the size of a pace is decided by mutual agreement. (9) In East Africa, the Chagga people measure out their round houses as follows: the tallest man around lies down with his arms stretched out and a string is measured from one set of fingertips to the other. This length is one 'laa'. A string two or three 'laa' in length is then tied to a fixed peg at one end and a hoe at the other. A circle is described with the

hoe, where the house walls are to go. The height of the door is also one 'laa' while the width is equal to the circumference of a man's head, again measured with string. In this system an exact relationship between proportions is ensured. (10) The standardisation is within the one building; it would be difficult to mass produce prefabricated parts for houses using such a system.

Some measuring devices are more rough. Swazi rush mats are priced according to their width, whether they are square or round. In Lesotho, the area of circles was traditionally a measure of the diameter only, while of rectangles it was half the perimeter (the length added to the breadth). This led to serious misunderstandings some years ago when an attempt was made to help farmers with their ploughing by hiring them tractors at a fixed price per acre. (11)

Traditional systems of measuring time may also differ from international standards. Frequently a day is measured from dawn to dusk, so that East African time starts at 6 a.m., for example, and the standard 1 p.m. will be seven hours. 'Weeks' also have a variable number of days, perhaps four or five, depending on the traditional market cycle. In both these cases many people may be operating on two different time scales, standard international and traditional. (12)

People's lives in the countryside everywhere are guided by the seasons and the weather. We should be particularly careful in teaching about agriculture to describe intervals of time with appropriate markers. Any farmer knows when the weather is right for planting, cultivating or harvesting; guidance on new or improved methods will always make more sense if instructions on timing are linked with the weather conditions or actual progress of plants. An instruction to plant seeds after the rains have started is more sensible than one to plant in a particular month. Reference to named months is therefore frequently unnecessary and inappropriate, as well as a potential cause of difficulty.

Many people use memorable events in the past as reference points rather than measured periods of time. A person may know his age from being born in the year of Queen Elizabeth's coronation, not from counting the years that have passed. In societies where there are age grades, people are grouped in sets of perhaps three years, so that age is not calculated precisely.

Traditional methods of measurement and international conventions may both be widely used in the same society, with many people understanding the traditional methods much better. Teachers need to become familiar with these methods if their lessons are to be well understood.

3 Conventions in using numbers

Conventions for grouping and ordering objects differ from culture to culture. Whereas in England eggs are bought in dozens, in Italy you buy them in pairs. In some countries Sunday is the first day of the week, in others Monday. Failure to observe such conventions can cause confusion, as arose with a Lesotho Distance Teaching Centre booklet on crochet. At one point readers could not follow

the instructions which talked about holding the wool with thumb and first finger. English first finger is the index, but in Sesotho your first finger is your little finger. (13)

4 Maths for fun

Mathematical development is seldom limited to the barest necessity. Number games are common almost everywhere, and extend mathematical experience beyond the purely functional. (14)

In Africa children's games include finger-counting rhymes, variations of noughts and crosses, and 'network' games, where you must draw in the earth a maze-like pattern in one continuous line. Logical riddles are also popular and games with arrangements of stones, where a player must identify a particular stone selected by his opponent. One game, 'tarumbeta', popular in Tanzania, starts with beans arranged in a triangle. These are taken away in turn and a child with his back turned has to give the number-name of the bean, but must not answer when the first bean in any row is removed. (15)

Several mathematical games are widely played by adults. Games of chance that use chips, nuts or cowries like dice involve skills of estimation and calculation. The most widespread game of all is that where a set of stones or beans is arranged in rows of dishes, and each opponent moves his stones in order to capture those of the other. This game has many names - 'wari' and 'solo' are some - and is very popular. The map in Figure 12.1 shows by shading all the areas where the game is traditionally played. The 'wari' type game

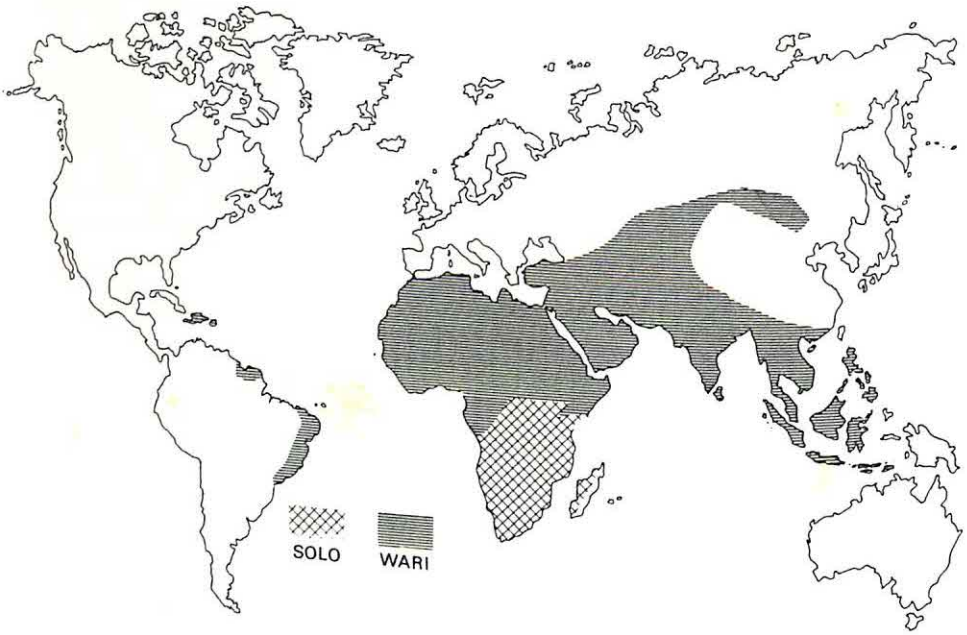


FIGURE 12.1 Map showing where 'the game' is played

is played with a two row board while 'solo' is played with four rows. Figure 12.2 shows a gaming board. The game involves quick thinking in adding and subtraction, and skill in estimation. (16)

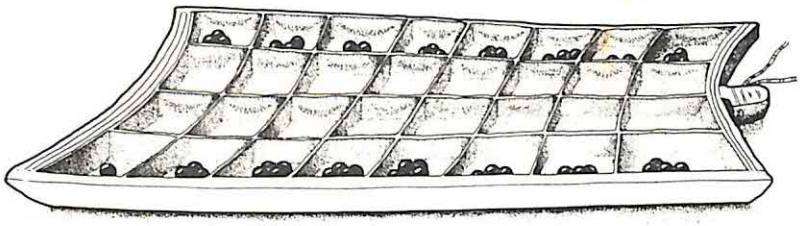


FIGURE 12.2 Board for 'omweso' from Uganda

Most of these games are based on action rather than words. Few require the players to use number-words; rather, calculations or operations are performed mentally and a piece moved or mark made. But games are popular and familiar, and each provides practice in one or more mathematical operations. Teaching which uses or adapts such games to develop mathematical points is likely to be attractive and easy to understand. (17)

TEACHING MATHS AT A DISTANCE

Teaching should start with an analysis of the average person's use of number. If approximation rather than precision is the normal basis for measurement, people will have difficulty adjusting to ideas of exactness. If people have a fixed world view and look for certainty in their lives, ideas of chance and probability are difficult. Mathematics teaching often challenges accepted values.

Whether we are teaching at a distance or face-to-face, the approach is similar. Maths teaching is systematic. Simple examples are used to lead to the understanding of general rules, which are subsequently applied to a variety of different problems. People with little or no schooling may have difficulty in applying a rule they know well in one situation to a different one. It takes time to realise that similar operations are examples of the same principle at work. Moreover, maths is hierarchical. The understanding of one operation is often dependent on the prior understanding of another. In distance teaching mathematical content must be presented with a thoroughness that allows those whose prior understanding is limited to grasp the ideas. The learner who makes mistakes may have no immediate access to further help.

The understanding of even simple mathematical concepts should not be taken for granted. Even those who have studied maths at school for years tend to have patchy knowledge of basic concepts. In a recent study in Lesotho, students who had passed Junior Certificate maths were tested later on their understanding of components of the syllabus. Only 13 of 36 topics were moderately well understood by the majority. (18) Knowledge of maths is unpredictable, particularly amongst those whose only teacher has been experience.

GUIDELINES FOR ACTION

Let us suppose that you are writing a manual on fertilizer use or some other practical topic and have come to a point where there is some incidental mathematical information. You now have to decide whether to teach the mathematics systematically from first principles or to provide an explanation that covers the point but will not necessarily be transferable to other situations. For example, one part of liquid fertilizer may need to be mixed with four parts of water. You may explain the mixing, with several different examples, so that in future readers will be able to measure and mix accurately liquids in any proportions; or you may suggest a method of measuring it out with a container, without going into the mathematics.

If you are producing a course or a series which is gradually and sequentially following a basic education curriculum, you probably teach the topic thoroughly; if the manual is on its own, you should first ask whether the maths is really necessary. In recipes, for example, exact quantities are often given where proportions are actually what is usually important. A recipe used in a diet sheet in Lesotho mentioned a quarter of an egg, which made people wonder whether it was bad for you to eat the whole egg. (19)

An INADES-Burundi booklet for village learning groups describes latrine construction as follows: (20)

> To construct a latrine it is necessary to dig a hole in the ground. This hole must be between 60 and 80 centimetres in diameter and between 4 and 6 metres deep. Then you must cover the hole with a plank bigger than it. (You can instead use reinforced concrete.) This plank will measure 1 metre 20 (or 1 metre 40) by 1 metre 20 (or 1 metre 40). In the middle of the plank there will be an opening of 30 centimetres by 15 centimetres. This plank will be put over the hole.

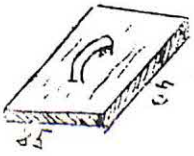
The diagrams in Figure 12.3 explain the text further.

It is unnecessary here to give such exact measurements. The width and depth of the hole need to be only approximate, and could be measured in relationship to a man's height or arm span. After that, the main points are that the cover should overlap the sides of the hole, the hole in the middle should be only as big as is necessary for its purpose, and the lid should overlap the sides of the hole. The construction could be described very clearly without any precise measurements.

Another example (Figure 12.4) is from an INADES farming booklet on the plant and shows how measurement can be simply taught. It explains how to sow seeds 10 centimetres apart. A simple technique is taught for making your own measure. The process of making and using the measure is explained clearly, with diagrams explaining the prose. The readers should in future be able to measure 10 centimetres whenever they need.

If we use a formal mathematical approach, we must start by explaining our terms and concepts. Mathematics uses symbols. A man who can read words may not be able to understand 'a piece of wood $2\frac{1}{2}$" x $2\frac{1}{2}$" x 6'' or 'a piece of land $640m^2$'. So we must remember to teach the meaning of any notation we use. In Figure 12.5, the sign for division is explained with pictures and examples. The ideas are presented with simplicity and the pictures are appropriate to adults. A radio explanation helps the learner to understand the page.

Dimensions pour cabinet



Couvercle.

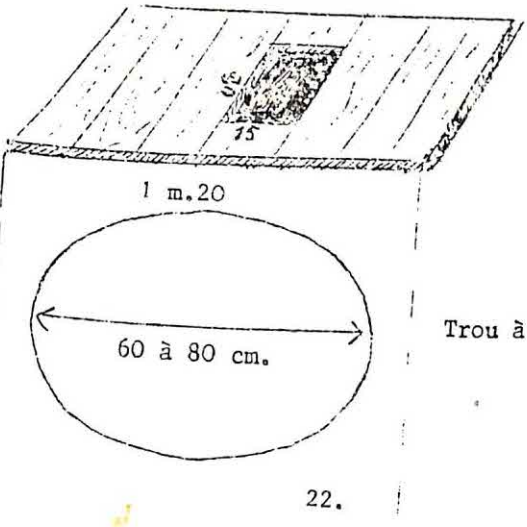


planche placée au dessus de la fosse.

Trou à creuser pour la fosse

FIGURE 12.3 How to build a latrine

- **How do you reckon 10 centimetres?**

Place your hand flat on a piece of paper.
The fingers must be kept quite close together.
With a pencil make a dot at the end of your little finger, and another dot at the end of your thumb.
That gives you the distance you must leave between two seeds.

Now **cut a little stick of the same length.**
You can use this stick to measure the distance between two seeds.
For instance in a 1-litre can, you put only one seed. It must be put in the middle of the can.
But you can put several seeds in a big gourd.

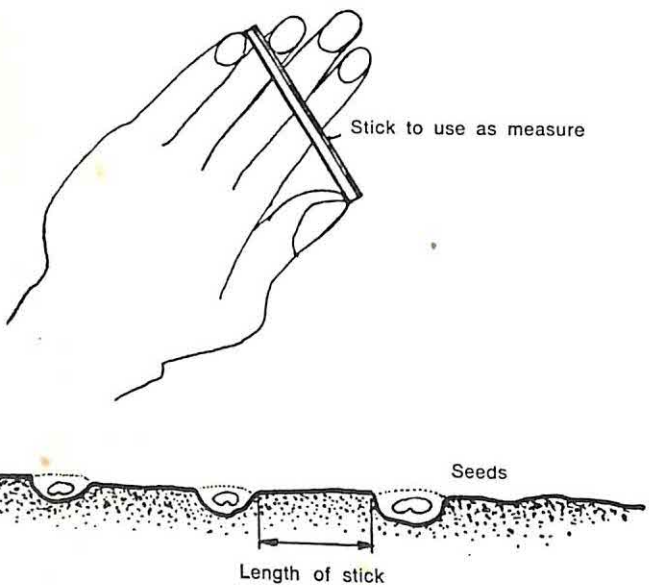


FIGURE 12.4 How do you reckon 10 centimetres?

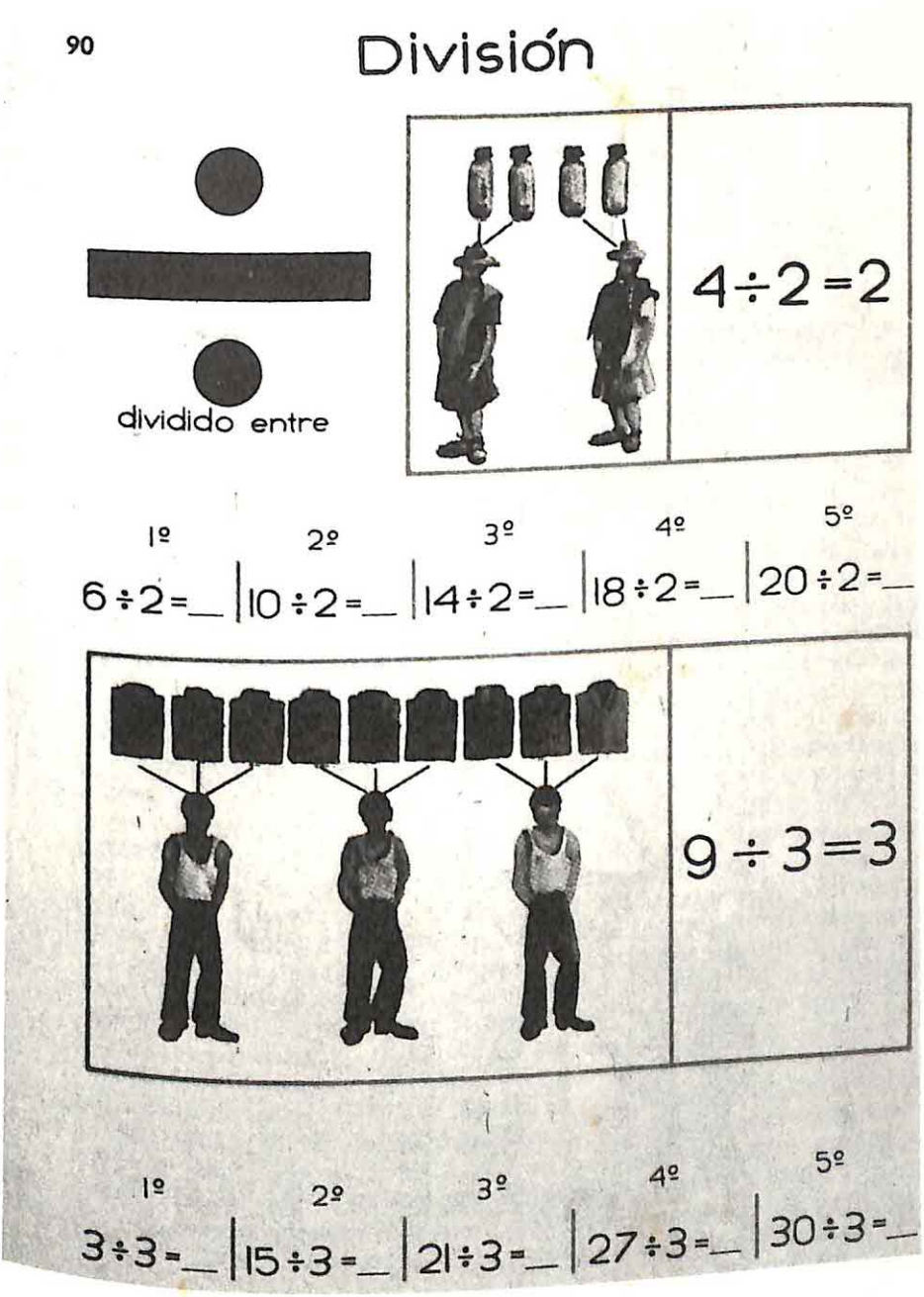


FIGURE 12.5 Teaching division (original in colour)

There are, in many languages, problems with vocabulary for mathematics. (21) Often the precise term needed does not exist, or words may be available but too vague in usage to convey the proper meaning, like the Kpelle word for 'half'. Symmetry, regular shapes and care for proportion may be evident in a society, and well understood in practice, but there may be no way of talking about them with mathematical precision. Mathematical games, for example, generally involve action and thinking, but seldom require verbal or written calculation.

Those preparing distance-teaching materials with only a little mathematical content have a difficult task. We are unlikely to want to introduce and teach an extensive maths vocabulary. We need to draw on words that combine the precision of mathematical terms with the potential for understanding. We must avoid vague words that only approximately express the idea we are presenting, and look for ways of expressing concepts from everyday experience.

When a term new to learners is used, it should not only be explained: learners should be given an opportunity to use it, in an answer to a question, perhaps, or in a discussion, so that they learn and remember it.

Where a learner must perform a calculation himself, he needs several examples for practice. These should be related to everyday experience so that they are easy to assimilate. Answers should be immediately accessible to learners - upside down at the bottom of the page, overpage, or clearly indexed at the end of a booklet. With access to answers, the learner can move on quickly and smoothly from one step to the next. Answers should also contain advice for those who have made a mistake so that they do not get stuck and give up. If the writer composes and writes down answers as he sets questions, he will pick out problems and teach more systematically.

When we are presenting methods of calculation, we need to consider how the information is to be used. Sometimes a learner may need to make numerous calculations, perhaps working out different prices for different quantities of goods. In such a case it may be helpful in the long run to teach her how to read and make a table: a farmer, for example, may be helped a great deal if she can use, and even make, simple pricing tables instead of having to calculate whether the price she is getting on each transaction is correct.

Tables, graphs, charts and diagrams are particularly difficult to understand. People who are excellent readers often find them hard, while people with poor reading skills find them even more difficult. Their usefulness, however, can outweigh the problems involved in teaching how to use them. Tables are particularly useful for reading off information, such as prices for different quantities of goods or amounts of seed or fertilizer to apply to different areas. Line graphs are useful for keeping records, of yield of crops, for example, or the weight increase of a child. Chart formats can display proportions or make comparisons. A health education programme, for example, could use a chart to show the relative frequency of a disease in different areas, and explain the importance of measures to prevent it. The chart in Figure 12.6 is from an INADES booklet for West African village women to use to keep their own records. The pictures fitted to the names of the months help make the chart simple to understand and use.

LES RECETTES DE CITA PENDANT L'ANNEE

POSTES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEPTEMBRE	OCTOBRE	NOVEMBRE	DECEMBRE	TOTAL PAR POSTE
1_CADEAUX													
mère		800							800			800	2400
autres personnes	200			200			100			150		200	850
2_VENTE RECOLTE													
gombos							300	300					600
CUEILLETTE													
bois	500	500	500							500	500		2500
champignons								300	300				600
PRODUITS TRANSFORMES													
riz décortiqué													
acheté	200	200	200										600
donné	1100	1100	1100										3300
karité				600	600	1200	1200	800					4400
3_SALAIRE													
TOTAL PAR MOIS	2000	2600	1800	800	600	1200	1600	1400	1100	650	500	1000	15250.F

FIGURE 12.6 Chart of Cita's annual income

Presenting maths well in print demands much space. A lengthy calculation should, where possible, be presented on one page. Diagrams must be placed in the correct sequence and next to explanations. Large page formats are often advisable. The example in Figure 12.7 is from the workbook of the National Extension College's 'Make it Count' for British adults who have difficulty in handling numbers. A sequence is arranged going down the page; the page is clearly headed, the point is explained in print and picture; an example is given, followed by an exercise at the bottom of the page. Notice also the symbol used for the exercise, and the clear but unobtrusive signpost to the answers.

An alternative, or additional, mode of presentation to consider is maths 'kit' materials. There are many simple and cheap possibilities using paper alone: measuring tapes, templates for cutting out shapes (such as dressmaking patterns), packs with a paper pattern to use and press-out or cut-out paper sets to make scale models of objects for construction.

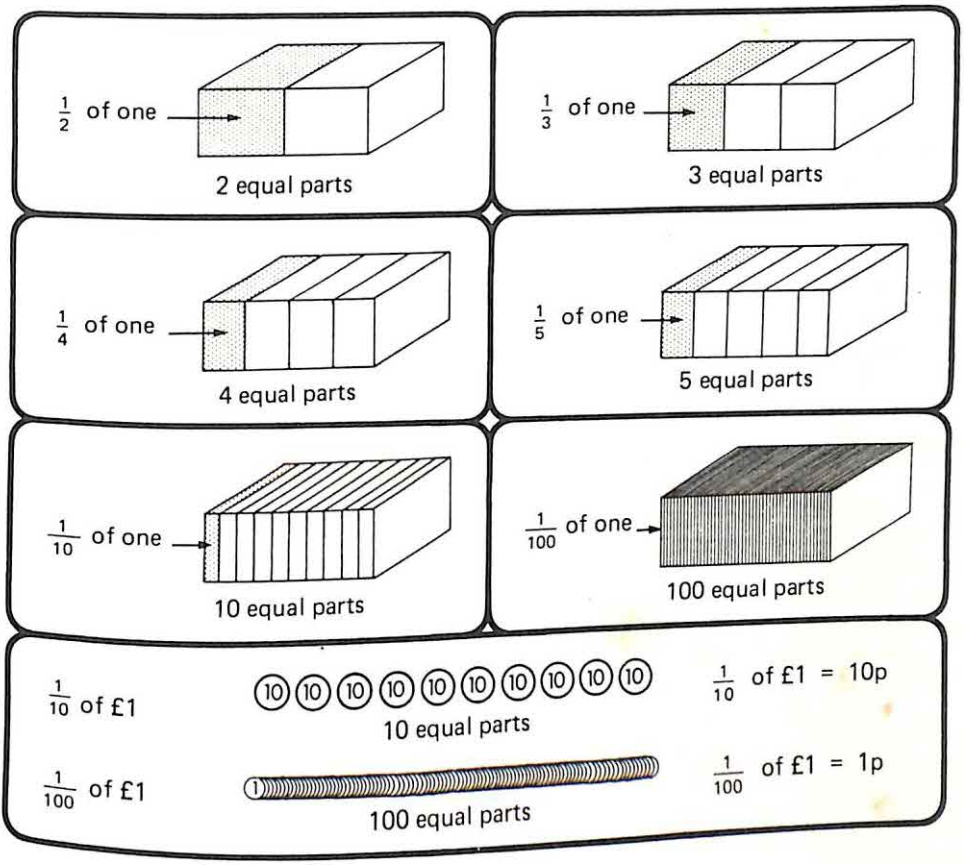
Practical aids of this nature can be of great help. As an experiment, children in Nigerian secondary schools made paper models, using work cards. The aim was to help them follow written instructions, get information from diagrams, use measuring and drawing instruments, and gain a greater English and mathematical vocabulary. These lessons were voluntary, but the children thoroughly enjoyed them, and their mathematical understanding improved. (22) A similar exercise with ready drawn cut-outs might be used in distance teaching to make a scale model of a construction such as a chicken coop later to be made in wood. Students learning at a distance are however sometimes reluctant to undertake practical work that does not have immediately useful results. Learning at a distance is in itself demanding, and extra demands are unwelcome.

While print offers the advantages of time and space for explanation and practice, radio and television are both effective for teaching maths. In Nicaragua, while children learn maths from radio under the supervision of teachers, adults at home are keen eavesdroppers on the schools programmes. (23) As for television, processes and changes can be explained very well in moving pictures. The relationship between symbols - notation in graphs, for example - and the objects or quantities they represent can also be well presented on the screen. Moving pictures can show consecutive stages one after the other in a way that might be boring or confusing on a page. (24)

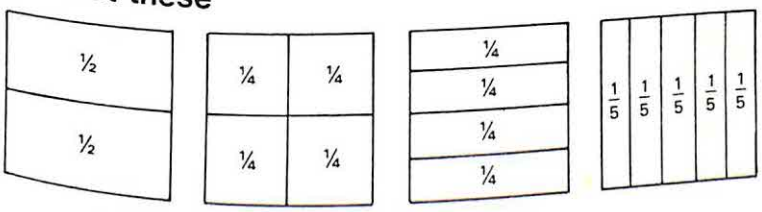
There are two problems to consider in broadcasting. First, there is a danger that the presenter will underestimate the need for precision in giving instructions for calculations or measurements. It is preferable to write a full script for any mathematical material. Second, there is the problem of individual differences in experience and understanding. What happens if a person has difficulty in keeping up or understanding a particular point? If we rely on broadcasts alone, we cannot accommodate different needs. Supporting materials can help individuals to learn at their own pace.

Part 7

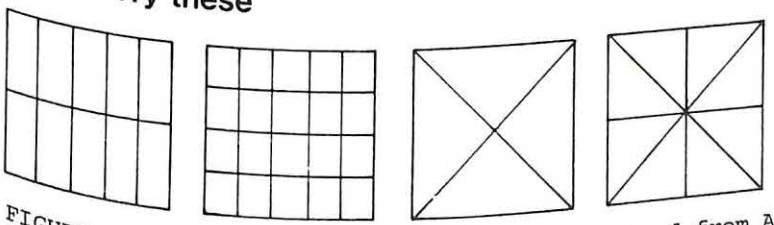
fractions



Look at these



Try these



The answers are on page 122

FIGURE 12.7 Page from 'Make it Count' (reduced from A4 original)

FINDING OUT IF IT WORKS

It can help if a mathematician and non-mathematician develop materials together. The maths teacher suggests ways of presenting the ideas, and the other raises objections, till all possible problems have been aired and agreement has been reached. After that, the material needs to be tested on a sample of students to discover whether it is well understood and fits local conditions.

The concealed clue technique may be useful for testing. (25) A problem is set; if the learner cannot do it he tears off a slip of paper from a sealed packet. He there finds a clue which may help him to get the answer. If he is still stuck, he tears off another slip, and so on. We could identify the average level of understanding of students or diagnose problems by finding out how many clues they need.

SUMMARY

Among different groups of people and in different cultures, the uses of number may be restricted. We can define the likely areas of restriction and predict the difficulties that are likely to occur.

We must then take into account our objectives and decide whether to teach formally the mathematics involved in a topic, whether to use the international or the traditional number or measurement system, or whether to avoid inessential maths.

If we do choose to teach the maths formally, we must do so thoroughly, taking care over language, presenting answers, using diagrams and charts, and investigating possibilities for kits and practical approaches. Maths can also be effectively taught by radio, television or film, provided that people can work at their own pace.

BACKGROUND READING

For general reading about maths and its teaching, a choice of an article or a full length book: Zoltan P. Dienes, On the Understanding and Use of Mathematics; Richard R. Skemp, 'The Psychology of Learning Mathematics'. For the cultural context of understanding of number, a short or a long book: John Gay and Michael Cole, 'The New Mathematics in an Old Culture'; Claudia Zaslavsky, 'Africa Counts'. The content of both books uses African examples but the ideas and the approach can apply anywhere.

For ideas about the curriculum for teaching maths, refer to the later chapters in Skemp's book, or to John Gay and Michael Cole, or to: Christine and Terry Riley, 'Teaching Numeracy'.

For help with teaching maths at a distance, there is little published about texts. Future reports of the Lesotho Distance Teaching Centre's 'Literacy and Numeracy for Life' project should be helpful. On teaching maths by radio, the regular reports published about the primary maths project in Nicaragua are useful, although about children.

Approaching science

Scientific method and traditional thinking - Teaching science at a distance - Language problems and text presentation - Doing experiments - A science curriculum for nonformal education - Summary

Science teaching reflects the best and worst in education. Good education enables us to develop ideas and solve problems for ourselves; good science teaching encourages independent enquiry and the evaluation of facts against hypotheses. Both require us to ask questions rather than accept answers, to develop a critical attitude towards accepted beliefs and new ideas. Unfortunately, much of what passes for education is indoctrination, the transmission of facts, statements and instructions from teacher to learner with no questions asked. Science teachers all too often simply dispense prescriptions to their students. Ideas open to different interpretations or theories involving experimentation are presented as facts, as the way things 'must' or 'should' be done.

Poor science teaching is common in schools, and even more so out of school. In nonformal education science is seldom taught as a subject, but topics that are open to scientific explanation frequently occur. Learning how to feed the family; learning how to prevent disease and care for the sick; learning how to grow improved crops or produce fatter, healthier livestock: in practical topics like these, scientific investigations and explanations can assist understanding. Often these points are badly taught or simply ignored.

Sometimes it is right to omit explanations of the scientific background. For example, mothers may learn to use a high-protein recipe to feed their infants without understanding the scientific reasons. If infant malnutrition is a serious problem, a quick prescriptive campaign may be needed to reduce mortality. Explanations can come later when danger is averted. On the other hand, a nutrition project could introduce scientific ideas simply and gradually. Similar opportunities arise in many circumstances: a handbook on rice growing could include an explanation of the chemical composition of soil, or a family-planning booklet could introduce the physiology of human reproduction.

A scientific attitude develops only gradually, so it is important to extend opportunities for increased understanding. We can encourage questioning, suggest new interpretations, offer explanations. Whenever scientific content recurs, we should choose in each case between prescription and explanation. Often that choice is not made: opportunities for encouraging a scientific attitude are passed over unnoticed. Yet such education is crucial, particularly where the traditional, accepted attitude to the world conflicts with a scientific attitude. This contrast between scientific and non-scientific thought needs further elaboration.

SCIENTIFIC METHOD AND TRADITIONAL THINKING

There are two major features of scientific method. One is the general attitude towards knowledge. The scientific thinker will seek new explanations of phenomena when old ones fail; his actions show he believes that knowledge and understanding of the world are always capable of extension. The second is the method he uses to extend his understanding. He conducts experiments to test his hypotheses - that is, his tentative explanations of phenomena - and, in the light of their results, accepts his hypotheses as true or rejects them and looks for others.

Both features have in common openness - the scientific thinker is always looking beyond what is already known - and both are dynamic. The approach is one where old ideas may at any time be modified or replaced in the light of new experience.

This approach is different from the deterministic acceptance of a stable world-system. The difference is particularly marked in societies which lack a tradition of scientific thought. In such societies there are strong cultural barriers against a scientific outlook. But, of course, in societies with a long history of scientific advances many continue to have an uncritical and fatalistic attitude to the world around them, while few consistently apply scientific method in their everyday life.

Both the scientist and the traditional thinker seek to explain the world as thoroughly as possible. The scientific thinker in her search will discover new phenomena: the basic elements of chemistry, the forces of physics, the particles of matter have all been identified in this way. She is prepared to change the substantial description of visible things - as, for example, the renaissance astronomers came to a new understanding of the solar system, rejecting the idea of a flat earth at the centre of the world, and accepting the idea of a spherical earth rotating with other planets round a spherical sun. The scientist will also look for unexpected relationships between phenomena. There is no once-and-for-all grouping of things into set classifications. In her search to explain the world more fully, she is aware that her understanding is never complete.

Similarly, the traditional thinker aims at a comprehensive explanation of the world. (1) But he does not seek out new phenomena. He classifies and orders into groups important objects around him. He offers descriptive explanations of events in the light of those groupings. Any new phenomena that appear are

absorbed into the existing system and explained in its terms. This implies that if you want to know the cause of an event, you can find it by selecting from existing possible explanations. You have no need to seek for explanations by testing possibilities and looking for evidence to support conclusions. The colour of a herb may link it with a particular bodily organ or disease, and so it is used as a cure. With each herb linked to a disease, some provide genuine cures while others are useless, purely magical, connections. A closed medical service of this kind is unable to look beyond alternative traditional relationships to discover other cures.

In traditional thinking, there are many complex sets of relationship which can display themselves in charms or rites that may appear bizarre both to those who use scientific method and to those from different traditional thought systems. For each system has its own rules. Phenomena are always fully explained within each system, but the explanations differ from one to another, according to the ways things have originally been grouped. If events suggest that an accepted explanation is not valid, then a different one is derived from within the system. The system is closed: it admits of no alternatives from outside. (2)

This major difference in attitude implies differences in methods used to determine explanations of events. The scientist starts with a problem in understanding phenomena, selects or derives a particular hypothesis and designs experiments to test it. She then carries out her experiment and uses the results to confirm or reject her hypothesis.

The traditional thinker, on the other hand, does not follow a procedure of hypothesis and experiment. His principles are established, and he uses the perceived or imagined relationships between objects to explain events, with no need for testing. Explanations for problems can only be found by enquiry within already existing arrangements of phenomena. There are only a limited number of possible explanations for an event.

The traditional doctor, again, maintains that there may be a number of kinds of explanation for illness: there may be a magical cause, a psychological cause, or a physical cause. In each case, there is a specific remedy in his medicine chest. Each can be tried in turn: in the event of failure of all three, his diagnosis is unchallengeable. There is simply some procedural factor he has overlooked, a relationship with an evil force the patient has omitted to reveal to him, or some other factor which, if it were known, would be within the doctor's control. The search for the correct cure is limited to a repetitive circling round possibilities within the system. (3)

The modern doctor uses scientifically tested medicines. Medical research workers are also constantly looking for new and more effective cures for diseases. This openness has led recently to investigating the physiological basis of traditional approaches to medicine - herbal medicine, acupuncture and the psychological techniques of the traditional doctor. But the difference in attitude to these techniques is profound. The good modern doctor has respect for any theories, but looks for evidence of their validity; others, less good, are traditional in practice and prescribe medicines uncritically. The traditional doctor has faith in his explanations, and needs nothing more.

In traditional thinking the sorts of explanations that can be produced and the sorts of relationships that are perceived between events are strictly limited. The framework used for classification closely determines the content of explanations. Adopting a scientific approach is not simply accepting another similar explanation of the world, but it means looking for or accepting novel explanations. In practice people may adopt a scientific outlook in some areas of their life, while accepting traditional approaches in others.

We need to distinguish between a person who is prepared to experiment and one who tries out something new within the framework of old ways of thinking. An example will help. Farmer T has a field next to farmer S. Both are poor; S is keen to try new ideas, while T is unadventurous. One year S plants his maize in a new way, evenly spaced in lines. At the end of the season, his yield is better than T's, who still plants in the traditional way. Next year, T copies S. Her yield is higher and she is pleased. But S has gone a step further: he has used a fertilizer on his field, and his yield is even better. Next year T copies again. Unfortunately there is drought this year, and both farmers have an extra poor yield. T discontinues the fertilizer treatment. She sees no reason to experiment since the old methods work reasonably well, and clearly it is largely out of her control whether or not she gets extra good yields. She is prepared to see if a new technique will fit into her system, but not to go beyond that. S, however, realises that the relationship between seeds, soil and inputs is capable of continual improvement, and will continue experimenting and learning. He can distinguish between different causes of events and interpret results constructively. He knows that the drought, and not the fertilizer, was responsible for his poor crop. He can use either failure or success as a guide for trying out further new ideas.

Any shift in farmer T's attitude would ultimately be likely to come from a number of successes with innovations and experiments. She, and others like her, are easily discouraged. A tentative exploration of scientific method can be suddenly halted, especially if the risk of failure seems high. And until farmer T understands that experiment involves calculated risks rather than chance, she will remain unconverted to a scientific approach. If we are concerned for her future success as a farmer, we have to confront her doubts and encourage a change in attitude.

In societies where science and technology play a large part in everyday life, people become accustomed to a scientific way of thinking and may as a result find it easier to accept scientific and technical innovation. In those societies, however, where science and technology play a smaller role, people have less opportunity to develop a scientific attitude.

TEACHING SCIENCE AT A DISTANCE

This is a difficult task. We know that adults can be reluctant to change their attitudes. While it is easy to state what we should be doing, it is not easy to decide how to do it. We need to en-

courage analytical thinking, and help people to understand new concepts and to develop problem-solving skills. To do this, teaching must be carefully structured, and debate, discussion and experiment encouraged. Practical work gives experience of solving problems. As learners become aware that an experiment can help them with one problem, they begin to see that this method can be applied to others. They begin to develop a scientific attitude.

Teaching science at a distance is difficult but it can be done as efficiently as in the classroom. The distance teacher is even at an advantage when he plans his teaching. Since we are used to the meticulous definition of objectives and to working out the content of the curriculum in the light of these, we often produce more effective science-teaching texts than the average text-book writer; and perhaps we hold the same advantage over many a class teacher. In addition, a non-specialist writer can call on a specialist to help with technical matters, whereas the class teacher would most likely have to cope without assistance.

Since in many countries conditions of life and traditional beliefs vary from region to region and between different cultural groups, we should consider carefully whether several versions of materials are needed. Suppose we are producing materials on animal husbandry to combat chronic cattle disease in a country with sharp regional differences. In the East, there are farmers with small herds who have recently diversified from arable to mixed farming, while in the West there are people who have herded cattle for centuries. The Eastern farmers keep cattle for beef. They are interested in the cash value of the meat and therefore want fat and healthy animals; quality of meat is of greater importance to them than quantity of animals. They are likely therefore to be receptive to modern medical procedures that keep their beasts healthy. In the West, the wealth derived from cattle is traditionally measured by the number of animals the farmer owns. His farming practices have developed to ensure the largest number of cattle rather than the maximum health of a few. Training such farmers in scientific methods of disease prevention involves a double challenge to their values, first in replacing traditional thinking with a scientific outlook and, second, in suggesting that the value of cattle lies in the monetary value of the individual beast. The same teaching materials simply will not do for the two different groups of farmers.

We must therefore always start by looking carefully at specific educational needs, and decide in the light of these whether our project can be centralised or must be locally run. Where different sets of values are challenged in different places, as happens frequently with scientific content, it may be a waste of time to produce common materials for different groups.

How should we present scientific material? In a written text, each time a scientific point occurs, we will probably deal with it something like this: the problem is stated, perhaps in the form of a hypothesis or a question; some examples are given to explain and illustrate; solutions are suggested and a practical trial is described; the learner follows the instructions, in practice or in his mind, and observes the results, which are also discussed in the text.

In elaborating the description of the problem, examples can be brought in from different local cultures. These may be stories or descriptive analogies, or perhaps proverbs. A survey in Nigeria found that enough proverbs existed to express almost all the ideas of physics contained in the school curriculum. (4) There is no need to confine oneself to the typical dry examples of the old-fashioned textbook.

It is, however, impossible to quote examples that are immediately relevant to all learners. We may, however, be able to use two or three widely different examples as a stimulus, and then ask the learners to imagine or observe further examples for themselves. Such an approach is particularly effective in a discussion group, but it can also be used to stimulate individual students.

Another approach is to have two different sets of material working together. A core text or radio programme, perhaps, stimulates interest in a topic and presents the problem. Examples are then presented in a different way, perhaps on problem-based work cards which go on to lead the learner through an experiment. A large number of different cards on one topic can be prepared, to fit a number of different individual and local needs. Selection amongst these can be guided centrally, by choosing cards for each region, or locally, by learning-group leaders, or individually, by each learner.

LANGUAGE PROBLEMS AND TEXT PRESENTATION

Science teaching presents three main problems here: learning and using technical terms; giving instructions that can be easily followed; and using diagrams to explain procedures.

Examples drawn from local experience help with the introduction of new vocabulary. A new word explained in a familiar context can be immediately clear and memorable. (5) Technical terms that express important rather than incidental concepts should first be explained, then followed by a question or exercise to help the learner absorb the word, and thereafter used consistently. Many languages lack adequate scientific vocabulary, and you may need to find alternative expressions or introduce new words.

Diagrams must be extremely clear and text and illustration should complement each other. Instructions for practical activities, whether in pictures or words, need to proceed in small, clearly defined steps, so that there is little room for error. You should always test instructions to see if they are clear. Even before you try them out on other people, you can do or simulate the task yourself. Botswana Extension College, for example, ran a course which included instructions for tree planting. The stages of planting the tree were simulated in the office using a wastepaper basket for the hole, a broom for the tree, the office teapot for the watering can and a spade as itself. As a result of this simple activity, a number of refinements and improvements were made to the instructions. (6)

The example in Figure 13.1 demonstrates each of these points. It consists of two pages from the English version of an INADES booklet, which explains soil structure so that farmers can see how and

why to improve soil fertility. The words 'impermeable' and 'permeable' are carefully introduced, well-chosen and clear diagrams illustrate the text, and practical activities are suggested to help understand concepts. (The container with sand, water and a hole in the base has already been used in an earlier lesson of the course, so the picture should be understood.) Each separate point is firmly differentiated with a number.

17. Wet clay takes whatever shape it is given, such as bricks, pots and stoneware jars.

18. When it is dry:

brown or black clay loses its water and cracks;
red clay also loses its water, but does not crack;
red clay can be used to make bricks and stoneware jars.

19. If dry clay is made wet again, it becomes soft and sticky.

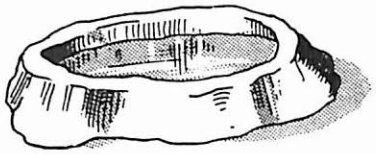
20. If clay is baked, it becomes very hard.
The stoneware jars keep their shape.

Wet clay sticks to the fingers

13

21. **Clay is impermeable.**

Let us make a little bowl with wet clay.
Pour a little water into this bowl.
The water does not go through the wet clay.
We say the **clay is impermeable.**



22. On the other hand, if you pour water onto sand, the water goes through.
We say the **sand is permeable** because it lets the water through.

Clay is impermeable.
Sand is permeable.

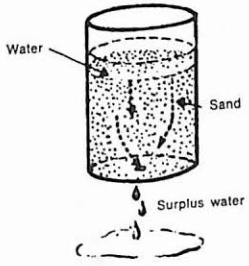


FIGURE 13.1 Discovering about soil: two pages from an INADES/FAO booklet

DOING EXPERIMENTS

Figure 13.1 illustrates too how a simple experiment can be included in a text. But simply describing the procedure for an experiment is seldom adequate. We have to convince learners that practical work is valuable and necessary, for they are often unwilling to do it.

One reason for this is fear that the risks are too great. Farmers dare not endanger their livelihood with new agricultural methods, mothers will not risk their babies' health with a new diet, women fear permanent sterility as a result of contraception. Even a small change or experiment can waken such deep-seated fears.

Confidence grows with understanding and experience, and these in turn derive from practice and experiment in a context which does not threaten - analysing soil structure, for example, before deciding on a fertilizer so that possible risks and benefits are understood. But learners often neglect such tasks. They may not understand the point of them, they fear they may make fools of themselves, or they are put off by practical difficulties. (7)

There are several steps we can take to make practical work easier and more attractive. We can start by deciding which experiments students must do for themselves and which can be dealt with equally well by other means. Some ideas can be grasped simply by observation. For example, the nature of clay soil can be deduced from observing its behaviour in rainy weather (puddles form) or in dry weather (cracks form on the surface). Others can be taught by 'thought experiment'. (8) Parts of an experiment are described and questions asked so that the learner thinks out how the problem will be resolved. For example, information on soil structure could allow you to deduce where underground water supplies are likely to be found. This technique can be used for certain experiments that can only be done with specialised equipment. Some experiments can easily be done at home, as they require materials that are readily available or can be provided in kit form. Others are difficult, dangerous, or require specialised equipment and should only be performed in a laboratory with the help of a specialist supervisor.

We may be able to organise our teaching so that it is difficult for learners to progress without doing essential practical work. The example in Figure 13.2, from an elementary science course for British adults, presents a simple experiment. The self assessment questions (SAQs) entice the students to complete each stage thoroughly. The results of the experiment are then used to move the discussion forward to a new point. Those who have not done the experiment will have difficulty in continuing.

Practical work should be sensibly distributed. If opportunities exist for meetings, perhaps through attendance at a clinic or at an agricultural training centre, we can arrange for practical work to be done in these supervised sessions. (9) At the same time, we should plan teaching so that there is a manageable range of activities in any one learning session. We should avoid clustering together a number of demanding activities. And we should tell learners how long it will take to set up and perform experiments.

Finally, we can do our best to predict students' practical difficulties. To help overcome these we should give clear instructions and list all the equipment that will be needed for practical work. This is best done twice, at the time the experiment is to be done, as in Figure 13.2, and before the lesson starts, to give students time to collect the materials they will need. We should check that all materials are likely to be available in people's homes or villages, and suggest alternatives where possible.

Science kits are an excellent way of providing learners with materials needed for practical work. The problems to consider in deciding whether to use a kit are practical ones. (10) First, cost: the items to be included may be expensive. You have to cost each item carefully and allow for inflation if your programme is intended to continue for some years. It may be possible to loan

Experiment 7

Apparatus
Two or three metres of fairly thick string.
Something to 'anchor' one end of the string on the floor, such as a heavy weight.
A space on a smooth floor (no carpet) which is two or three metres long and about a metre wide. A floor with plastic tiles is very suitable.
A small amount of brightly coloured wool or thread.

Anchor one end of your string at the centre of one end of your floor space. Stand at the other end of the space and hold the other end of the string, holding it as near to the floor as possible without stooping. Hold the string so that it is just tight and then take one step forward so that there will be a small amount of slack in the string and for most of its length the string is lying on the floor.

Move the hand holding the string suddenly to one side and back to its original position. Repeat this several times and observe the effects on the rest of the string.

SAQ 9 (a)
Does the whole piece of string move at the same instant as your hand? Try to describe the effect which is produced on the string.

Ans. 9 (a). (2 min.)►

Now move the end of the string regularly from one side to the other. Make the amplitude of this vibration about 30 cm and keep the frequency fairly low, about 1 Hz (*see* page 113).

SAQ 9 (b)
Describe the appearance of the string when this vibration is kept up.

Ans. 9 (b). (2 min.)►

Mark a point on the string, about ¼ of the distance from the end which you hold, by tightly tying on a piece of coloured wool or thread. Vibrate the end of the string as you did in part (b) and watch the movements of the marked piece of string.

SAQ 9 (c)
Describe the movement of the marked piece of string.

Ans. 9 (c). (2 min.)►

Vibrate the end of the string regularly at frequency of about 1 Hz, then about 2 Hz and then at about 3 Hz.

SAQ 9 (d)
Describe the change in the waves which is produced by changing the frequency.

Ans. 9 (d). (2 min.)►

End of Experiment 7

FIGURE 13.2 An experiment from an elementary science course for adults

equipment to learners, perhaps charging a deposit, but normally kits are not reusable and either you or the student must pay. Second, you will have to check that all the items suggested are available and will continue to be available in sufficient quantity for the duration of the course or project. Third, you will have to think about how the kit will be distributed. If it is to be posted, it must be easily packed, not too big or too heavy. It is better to pack it in one parcel, which may be difficult if items are of grossly different shapes or sizes. And, however it is distributed, it must be readily transportable. It must be able to stand up to the time the journey will take, so perishable items must be excluded, and it must be safe in transit; some chemicals, for example, are volatile, dangerous to post and difficult to transport by other means.

It is difficult to decide precisely what to include in a kit. One possibility is to include all the items necessary for all experimental work in the programme. A physics kit used by the National Extension College in Britain for home students studying as adults for secondary-level examinations included items like a comb, a reel of cotton and a duster. These were likely to be available in the home of every student, but they were packed as part of the kit so that the student was not distracted or held up by having to look for an item. As learners are easily discouraged from doing practical work, it can help if everything is readily accessible.

The alternative is a kit comprising only those items that are not easily available in home or village. Here we must check carefully that all items needed but not supplied are genuinely available. We might, for example, provide people with all the equipment for making a simple electric motor except a battery, assuming this will be available, and then discover too late that some people cannot get batteries of an appropriate type.

It is sometimes possible to plan practical work so that some items are used several times. A teacher in India, for example, has worked out a way of teaching all the basic principles of Newtonian physics with a bicycle frame as his apparatus. (11) Similar possibilities may occur to you for teaching a number of topics with a limited range of apparatus. (12)

A SCIENCE CURRICULUM FOR NONFORMAL EDUCATION

In nonformal education scientific topics must often be taught in isolation. It can be difficult to see how to generate the gradual growth of understanding that is necessary for the development of a scientific outlook. The curriculum described below is offered as a source of ideas. (13) The curriculum itself is hypothetical, but the different elements are all based on real projects.

The students are young mothers who have had little formal education. The starting point is an unacceptable rate of infant mortality, coupled with widespread malnutrition amongst young children. Let us suppose that two major causes have been identified. One is the rise of bottle feeding in place of breast feeding, the other the poor nutritional quality of weaning foods given to babies. Through talking to young mothers we discover that there appear to be three

immediate obstacles to improvement: a belief that bottle feeding is better, from the influence of fashion; a belief that sexual intercourse and breast feeding are incompatible; and poor understanding of an infant's nutritional needs and the values of different foods.

We decide to start with a campaign to promote breast feeding. We use radio spots, newspapers, magazines and films to encourage breast feeding, and organise discussion groups of school children, community groups, fathers and clinic patients. After six months a greater proportion of women attending clinics are observed to be breast feeding. So far we have helped to bring about a rapid change amongst an acceptable proportion of mothers. But there is no marked improvement in babies' health or drop in mortality rates - deaths from malnutrition usually occur after weaning. Our programme should not stop, and change may only be short term. There has as yet been no real challenge to the mothers' way of thinking.

The next area to tackle is the infant's diet. Our approach may begin to diversify here. A campaign, similar in style to the breast-feeding one, may give information on food groups and the effects of good foods, or it may simply stimulate interest in finding out more. We may establish learning groups in well-baby clinics, or other places where young mothers meet together. These may study nutrition together with literacy and numeracy, using booklets and radio programmes. Other groups may use work cards, and yet others watch cookery demonstrations. For those not in groups, recipe booklets are sold on bookstalls and in clinics. A variety of learning opportunities are thus offered which reach large numbers and help literate and illiterate people alike. As infant diets are studied, the mothers begin to realise that different kinds of foods have different functions. They begin to work out diets for themselves, and analyse the nutritional value of regional specialities or their own favourite dishes.

As these ideas take root, changes become apparent. Infants are plumper and less prone to disease. This step forward can now be reinforced by further developments. There are several possibilities, from which different groups may choose. Growing vegetables will help to provide foods for a balanced diet; we can provide students with seeds and manuals. As they work in their gardens, the mothers can learn some basic agricultural science, and experiment with their crops in a way which is impossible with babies.

They could also move on to learning about nutrition for the whole family - an important step forward intellectually, as they will be assessing what they have already learnt about feeding babies and applying the principles in new conditions. They would need to consider food for older children and adults, and diets for the sick, the elderly and the pregnant. Or they could learn more about health generally, linking nutrition with human biology and thus deepening their scientific understanding. Family planning, again linked with human biology, could also be covered. Some groups might want to learn about income-generating activities, motivated by the need for cash to buy better foods. In this case print and broadcasts could teach practical skills, and move into education about co-operatives.

We could generate many more ideas, many of them closely linked to the development of the understanding of science. An integrated

programme such as this might also include education for teachers, children, health workers and so on. But the point should be clear. It is possible to follow up one project with another so that a scientific attitude gradually becomes part of the learners' thinking. And in such a scheme distance-teaching methods are linked with shifts into face-to-face teaching, for cookery demonstrations and family-planning advice, for example. Centrally produced materials on some topics can be complemented by regional materials on perhaps local crops and foodstuffs. We have suggested a scheme which encourages a scientific outlook, and includes varied and relevant practical work.

SUMMARY

Much nonformal education requires some understanding of science. The educator faces a difficult task, since many adults have a restricted view of the world. They need to develop a scientific outlook, and to do so they must be prepared to reject their old beliefs and values. Scientific material must therefore be carefully designed to proceed in small steps and to relate to local conditions. We must deal in a straightforward and clear way with specialist language, diagrams and instructions, introduce experiments that are attractive and easy to do, and use kits imaginatively. An example has shown in some detail how a science curriculum can be developed in response to ordinary problems.

BACKGROUND READING

For approaches to science: Robin Horton, African Traditional Thought and Western Science; Claude Lévi-Strauss, 'The Savage Mind'. For teaching science: John arap Siele and Gerry Hacker, 'Teaching Science at a Distance'; Frederick J. Thomas and Allan S. Kondo, 'Towards Scientific Literacy'.

Chapter 14

How to help learning

Learning from different media - Making materials easy to learn from - Immediate reinforcement - Substantial activities - Relating learning to personal experience - Summary

We learn only if the conditions are right. Our understanding of new material depends on how interesting we find it, and on what we know already, on its presentation, and on our motivation to learn and remember it.

In face-to-face education, the teacher can arrange his lessons to suit his students. He backtracks, asks questions, initiates discussions and sets exercises whenever he sees the need. The teacher at a distance has to approach his teaching quite differently. He must design materials that motivate, explain and teach. This chapter draws together themes from previous ones, and suggests guidelines for making effective teaching materials.

LEARNING FROM DIFFERENT MEDIA

How far can teaching materials encourage learning? First, whatever medium is used, it is generally possible to attract and hold the interest of students. Stimulating and relevant subject matter can catch the attention, while variety and frequent demands for a quick response can help to hold it. Similarly, in any medium we can organise material so that it is easily understood; the requirements are that explanations and examples are relevant and clear, and that there are sufficient activities suggested to reinforce understanding.

It is more difficult to encourage learning that lasts. If students are to retain new ideas, they need to make use of them as soon as possible. Simple activities will help them to absorb small points: these are not so difficult to provide in any medium. But in order to put together and retain a range of facts or ideas, they need both to make some substantial use of them, and to relate them to their personal experience. As teachers, we have less control, and what control we have diminishes as the learning becomes more

substantial. In our materials we can use techniques that bring about immediate reinforcement of the points we have taught; we can give directions for learning activities, but we cannot be sure that they will achieve what we intend; we can provide an environment that should help learners relate what they are learning to their personal experience, but we must rely on them to follow this through. The support we can give is therefore crucial. We must design our materials so that they give all possible encouragement to students to follow up what they have read, seen or heard. The nature and the organisation of this support have to vary with the teaching medium.

The main problem is one of timing. The activities we will suggest will range from simple repetition or quick responses made verbally or mentally to more demanding written or practical exercises. All of these can be easily set down in print. With radio, many activities must be postponed until after the programme, as there is only limited scope for pauses, while with film or television activities during the showing are severely restricted.

Suppose, for example, we want people to do a written exercise. Where the instructions are printed, there is no problem. The student reads the text, and then writes the answers. He can pause in his reading or refer back to the text whenever he wants. With radio, he can manage so long as a pause is provided for writing. He could also take very limited notes as he listens to remind him of what he has heard. With television or film he can again write exercises if pauses are provided, but taking notes is very difficult indeed. He cannot use his eyes to watch a film and watch his own writing at the same time.

As the practical physical requirements of performing different activities increase, we are forced to postpone more and more activities until after the presentation of the material. Moreover, activities after a radio programme or a film must take into account the fact that the student has not been able to learn each point thoroughly as it was presented, nor has she any means of referring back to the material. We can certainly suggest activities of all kinds, whatever medium we are using, but we should suit them to the medium.

MAKING MATERIALS EASY TO LEARN FROM

Activities provide the main stimulus to learn, but the organisation of materials also has a contribution to make. We should consider using devices - of language, of typography, of sound or visual effects - to attract and hold attention. (See Figure 14.1, and figures in Chapters 7, 10, 12 and 13.) In printed materials summaries, prominent headings or rhetorical questions before an explanation (see Figure 8.6) all help people to absorb material more efficiently. (1) Or the teacher can explain the same point in a different way, complementing prose with a picture or a list, or quoting an example quite different from the previous one. Similar devices also help with films. (2) It seems to make no difference what sort of devices you select, and there is no need to include many cues of this kind. (3)

We can divide activities into those which provide immediate reinforcement of learning, those which demand more substantial work, and those which help people to relate their learning to personal experience.

IMMEDIATE REINFORCEMENT

Teaching materials should include numerous activities to help students learn each new point. Such activities are not directly related to major learning objectives, but serve merely to make sure a point is understood and noted. They should therefore be quick and easy to complete, so that they do not distract the learner from her main objectives.

Some types of activity simply require people to recall or repeat a point, and thus encourage retention. Two types of question are most suitable for stimulating quick recall. Both can be presented in words alone or in words and pictures, and both can demand either a written or an oral response:

1 'Short-answer' questions. A question that requires an answer of one word or one sentence only: there should be only one possible correct answer. This type of question is easy to devise, but many questions of this kind may become monotonous.

2 Restricted response questions. A variation of the short-answer type. The question asks people to list a number of items from material just learnt. The questions therefore often take a form such as 'Name the main items ...' or 'List three features of ...'. The chief constraint is that answers must be carefully devised to include all possibilities.

Other types of activity go beyond mere repetition and encourage the learner to make immediate use of new knowledge. Both 'recall' types of question can sometimes be used to provoke further activity by the student. For example a particularly useful form of 'short-answer' question is a sentence with one word omitted, a technical term that has just been introduced. By saying or writing the word, learners are helped to absorb it into their active vocabularies (see Figure 7.2). There are in addition some styles of question which make learners display and reinforce their understanding by selecting the correct answer from amongst others:

1 True-false questions. These involve selecting between two statements, one of which is true, the other false. They are easy to devise, but there are two drawbacks: if you choose the wrong answer, it may stick in your mind, and you can guess the answer and be right half the time.

2 Multiple-choice questions. These consist of a question, known as the 'stem', and between three and five alternative answers, one of which is correct and the rest incorrect 'distractors'. There are several constraints:
   - Much information has to be given at once, which presents difficulty in broadcasting.
   - Learners can guess answers, though they will seldom be right.
   - For those with a poor grasp of a language or of reading, understanding fine differences of meaning between distractors can be difficult.

- It is difficult to compose convincing sets of multiple-choice questions, particularly when the teacher must use only a small vocabulary.

3 Matching questions. These consist of a set of questions or stems and answers side by side. Each question has to be matched with the correct answer, in printed texts frequently simply by a line connecting the two. Two sets of pictures or words and pictures can easily be used as matching pairs if people have reading or language difficulties. This sort of exercise is too complex to present on radio, but can be done on television provided that pictures are used for at least one set of items.

With printed materials, we have a wide choice of styles of question for reinforcing learning. With radio, television or film, questions which require selection are rather difficult to present. In addition, we must provide immediate answers to all such questions. Since the questions are intended to be easy most people will get them right, but for the few who do get them wrong some chance of repetition is necessary. It would be tedious to present a lengthy question over again on the air, whereas with print the learner has the option of re-reading. So we should generally reserve the more complex styles of question for print.

The form and position of answers to such questions needs some thought. In broadcasting our only option is to state answers immediately after time has been given for a response. In printed texts there are several possibilities.

We have been talking about questions that aim to drive home points already explained, not questions that involve complex thinking. There is therefore no virtue in making things difficult by concealing the answers. Indeed the student who cheats and looks up the answer before he tries the question may well be teaching himself the point as effectively as the student who attempts the question first. However, most people will not feel confident that they are learning if they always see the answers, so they should not be too obvious. They can be placed: at the foot of the same page; over the page; upside-down, beneath the space to be filled, for one-word answers; at the end of the booklet; in the margin (below the question) if layout allows. Answers can be presented in a different typeface from the rest of the text. An italic typeface could be used, as in Figure 14.1, as this takes longer to read than roman script, and so makes it more difficult to take in the text at a passing glance.

Wherever the answers are placed, they should be easy to find and identify. As the first questions in a text are introduced, the system adopted should be explained and practised. Where answers are on a different page, the page number where they are to be found should be given with the questions, and the answer should also refer back to the page where the question is found. It is generally better to have answers near the questions rather than at the end of a lesson or booklet. It is frustrating to keep turning back and forth when questions are frequent.

Even where questions are only testing simple recall of items just learnt, care should be taken to make sure that answers given are sufficiently comprehensive. Where there is any doubt about whether

PLANTS

LESSON TWO

In lesson one, you learned that all plants have a root system and an aerial system.

Which part of the plant joins the root system to the aerial system?

_____

the collar

THIS LESSON

In this lesson you will study six different root systems. You will also find out why a potato is not a root.

You will study the anatomy of each.

And you will learn more about the functions of roots.

Give one function of roots here. _____

they take up mineral salts

AN EXPERIMENT

You will also do an experiment at the end of this lesson.

You will need two bean seedlings and one maize seedling from the plants which I asked you to sow in tins when you received your last book.

You will also need a carrot seedling. Go and pick one from your garden.

Have them beside you as you study so that you can observe the different root systems.

FIGURE 14.1 Placing the answers to revision questions

students will answer correctly, or where a trial of the materials shows students tend to make mistakes, the answer can include an explanation of how it is arrived at. It can also refer back to the text where the point was introduced, and should, where relevant, provide an explanation of common errors. Sometimes it is even useful to provide an additional question in the discussion of the answer, to test whether the point has now been understood. Such extensive answers are desirable for probing or difficult questions, but should seldom be necessary where questions are only intended to reinforce understanding. If many learners have difficulty with a question, then probably the point was not well taught in the first place, or the question itself needs rewriting.

SUBSTANTIAL ACTIVITIES

These aim to develop understanding rather than merely reinforce it. They include both practical and intellectual activities. In planning them we should consider the major learning objectives we have defined and provide an activity to show that each has been achieved.

1 Written exercises

The stimulus for these may be questions of any of the types already suggested, but the learner must spend more time thinking or pursuing information in order to work out the answer. Different people will complete such questions at different speeds. Such questions should therefore be posed after a broadcast or film, whereas they can be built into printed materials at any appropriate point.

Some of the questions may be much more open-ended than reinforcement ones. Sometimes, for example, we may require a piece of writing that expresses a personal viewpoint. Care should be taken that open-ended questions are not too demanding. Firm guidance needs to be given on structuring the writing and, particularly for those who are studying alone, advice on making notes, or other relevant study skills. This is difficult to do without the assistance of print.

2 Practical activities

People must be stimulated to perform the activities and shown how to do so. The transient broadcast media are best supported by print for reference, as we may be able to remember only a few instructions, and need to check at each stage whether we are proceeding correctly. It is helpful to have at various points a question, a checklist or a diagram so that we can check progress.

3 Discussion

Discussion as an activity is important as a mechanism for sorting information to help us define our point of view or make decisions

before action. For the learner studying individually at a distance, discussion can take two forms. It can be a dialogue at a distance with a tutor, by post or less frequently by telephone. Or she may have access to occasional classes or seminars. In either case the learner does most of her thinking and learning alone. Broadcasts can relieve her sense of isolation.

For groups studying together discussion can be effectively stimulated by any medium of instruction. Questions related to learning objectives can provide guidelines and we can indicate a number of possible conclusions.

RELATING LEARNING TO PERSONAL EXPERIENCE

Whether our learners are to write, talk or take action, when we ask them to relate their learning to their own experience, we are asking them to make their own contribution to their learning. We can stimulate them to do this, but can never hope to include in our materials all the points they will want to use. So this aspect of learning is rather different from those considered so far.

How far can we go in assisting? We can choose between producing materials centrally or regionally. Materials intended for a wide and varied audience must be prepared with particular care, to accommodate cultural differences. But it is never possible to present material that is totally relevant to each individual. The only sensible approach is to get people to think about their own circumstances. We might use questions like the following:

'We are going to study ways of preparing soil for planting. What do you do now to prepare your soil?'

'Mosquitoes breed in these sorts of places: (list) Which of these do you have in or near your village?'

'What foods do you regularly give your children to eat?'

Such questions are the first stage in a process where local practices are compared with new ideas, the relationship drawn out, and new ideas accepted or rejected on a basis of understanding rather than whim. The questions could be followed by a number of activities, many demanding an assessment of personal experience. For example, a nutrition project for rural mothers might proceed along the following lines. After the women have listed the foods commonly eaten in their locality, they could learn to classify them according to their nutritional content; this would involve explaining about carbohydrates, fats, proteins, vitamins and minerals, and giving examples of each kind of food. The next stage would probably be to get the mothers to describe the daily diet of their children as it is now. Then we might introduce new information, suggesting some good diets, explaining the importance of different foods. The mothers will compare the new diets with their analysis of their children's present diets. They can be asked to list those foods suggested in the alternative diets that are available in their locality. They can then consider modifying their children's diets by introducing some of these foods. They may accept changes or reject them, but decisions will be based on an understanding of the relationship between the new ideas and their current local practices.

A programme of this kind, presented step by step, would require several study sessions; it is sketched here only in the barest outline. The activities suggested move backwards and forwards between gathering information from one's environment, and relating that information to new ideas. It is difficult to provide answers to these sorts of activities, but it is important to do so. Mothers will quite rightly not take risks with their children's diets, so they need some help in evaluating the accuracy of their classifications and the worth of their decisions. We can offer two or three sample answers, taken from different regions. For the child's daily diet, for example, we could present it like this:

'Mrs M, in the Northern region, gives her child the following food each day ...' (listing the foods given at each meal)

'This is what Mrs T in the Eastern region feeds her children ...'

Such case studies could be developed later, to provide continuity.

Material of this kind is much more satisfactory when studied in a group than when studied by individuals. It is very difficult for an individual to assess for himself the validity of his experience. When someone is studying alone, written exercises for a tutor should ask him to report on his personal experience. A central tutoring service will not have any knowledge of particular communities superior to that of the people who actually live in them but should have relevant technical expertise; and the tutor can open up a dialogue, giving students an assurance that their own experience is valuable and relating new knowledge to that experience.

SUMMARY

Our teaching should include activities to provide immediate reinforcement of learning, to encourage people to develop their understanding, and to help them relate ideas to their personal experience. Activities must be arranged to suit the medium. Print is the most flexible, and can include activities of many kinds. With broadcasts or films, substantial activity must be delayed until after the presentation; since our memories are limited, it is difficult to bring about extensive learning with these media alone. There are therefore advantages in combining media so that they are complementary. But beyond a certain point learning depends on how the materials are used as well as what is in them. In the next chapter we therefore consider different ways of organising the use of distance-teaching materials.

BACKGROUND READING

The best background to this chapter is to examine examples of materials. In addition there are: Janet Jenkins, 'Editing Distance Teaching Texts'; International Extension College, 'Writing for Distance Education'.

Supporting learning

The value of support - For individual learners - For group learning - Two-stage approaches - Informal integration - Problems - The cultural implications of group learning - The cultural implications of individual learning - Summary

Printed or broadcast materials alone can teach but their effectiveness depends also upon the way they are used. The timing and efficiency of distribution, mechanisms to pace learning, external assessment, counselling, group teaching or discussion sessions all make a difference.

THE VALUE OF SUPPORT

What difference can such support make? Our knowledge of this is incomplete. Here are some examples where effects can be attributed to specific aspects of support systems.

1 Perseverence and West African farmers

Some groups of farmers in Mali were studying better farming with the help of the correspondence course produced by INADES. A literate group member would read to the group from a booklet; they would discuss the content and put the ideas into practice. The literate leader met frequently and regularly in a group with other leaders and a supervisor who explained the next stage of the course and discussed problems that had arisen. In nearby Upper Volta similar groups were meeting. Their social and economic circumstances were much the same as those of the farmers in Mali. But group leaders were given less frequent and less regular support. In Mali, many more farmers continued to attend groups until they had completed the course, and most groups finished their course more quickly than the Upper Voltans. The support for the group leaders made a great difference. (1)

2 Counselling and dropout among Canadian adults

About 3,500 people in one province were completing an unfinished secondary education, using printed materials and television programmes. A counsellor regularly visited the homes of all registered students. Only 15 per cent of students failed to complete the course, a very low figure for an extended course of distant study, where dropout often exceeds 50 per cent. (2)

3 Sharing experience among correspondence students in England

At the National Extension College people usually study from printed materials alone with postal tuition. Students that attend optional seminars report renewed enthusiasm and new confidence, gained from realising that other students share their problems. They are also more likely to complete their courses. (3)

4 Radio for motivation in France

Correspondence students listened to radio programmes as part of their study. When these were replaced by tape recordings, many students did not bother to use them. They had been using the radio programmes more as an incentive to keep them studying than as a means of instruction. (4)

5 Effective learning and groups in Lesotho

People were using booklets to teach them how to crochet. They worked in three kinds of groups: with no trained leader; with a leader with the barest minimum of training; with a leader trained quickly but intensively. People in all groups learnt a good deal. Those with the thoroughly trained leader learnt most. The other two kinds of groups achieved much the same. In this case, if the leader was to be trained at all, it had to be done thoroughly. (5)

These examples show that a variety of support strategies can be used to approach different problems. How do we organise the right support for our materials? Some more examples offer suggestions.

FOR INDIVIDUAL LEARNERS

Individual learners tend to be isolated. In an extended course of study, they are easily discouraged. The gap between collecting information and translating it into action is particularly difficult to bridge on one's own. Assessing the quality of one's performance is also difficult in isolation, but the problems can be overcome.

1 Radio school for family education in the Dominican Republic: support for listeners at home

Set up by the Dominican family-planning association, the school broadcasts daily on commercial stations, covering family planning, child care and health education. To support the listeners, posters, leaflets and booklets are distributed. Letters from listeners are used to determine programme themes and inform extension workers, who visit local groups and clinics. The formation of listening groups is encouraged. (6)

2 The British Open University: support for the correspondence student

Most of the student's time is spent studying texts alone at home. A typical credit course requires 360 hours' study. The main medium of study is course texts of about 32 units. On an average course, support to learning is given by 8 computer-marked assignments, 4 tutor-marked assignments, 16 hours of instructional broadcasts (television and radio), 1 week at summer school, together with regular optional seminars at regional study centres and weekly broadcasts on matters of general interest to students. It is therefore an integrated and comprehensive system of support. (7) Results indicate that of the 1971 intake of 19,581 students who decided to continue studying after a three-month trial period, 52.7 per cent had completed their studies by 1977 and over 3,000 were still studying. (8)

3 Radio Santa Maria in the Dominican Republic: support for the home student in a radio school

In this system, radio and print are of equal importance for the teaching. The learner is generally a young adult studying at primary school level. He alternates between listening to radio instruction and completing exercises in a workbook. A little study is done each day. Once a week, every student goes to a group meeting. The week's work is discussed and next week's workbooks distributed. The meeting is supervised by a monitor, who also corrects workbooks. He is not a trained teacher. Indeed, he often has little more education than his group members. His job has been clearly defined for him, he has clear written instructions on the procedure, and attends a regional group meeting every few months. He is also visited regularly by school field staff. (9) The system works well: in one recent year just over 20,000 students enrolled on courses for six different grades. Just over two-thirds of those enrolled took the exam for promotion to the next grade, and well over three-quarters of these passed. (10)

FOR GROUP LEARNING

The problems faced by individual learners recede if they meet in a group. The learner is no longer isolated, and the group can well

assess its own progress. The examples suggest different ways in which media and groups can be used together.

1 Correspondence courses for African farmers: INADES

The course for farmers and the system of group leaders and field workers have already been described. Each group, when it completes a lesson, posts off for comment a report form containing answers to simple questions. Thus progress is externally assessed in addition to the internal assessment provided by the results visible on the farmers' land. (11)

2 'Radio éducative rurale', Senegal: radio used alone as stimulus for learning

The farm forums of Africa and Asia and the radio clubs of francophone Africa rely chiefly on radio to promote their aim, 'listen, discuss, act'. Some use a limited amount of printed material to outline content and record discussion questions. In some places there have been projects using television in much the same way. (12)

Members of the radio clubs in Senegal, as we saw in Chapter 1, were organised into village clubs. They listened three times a week to a programme called 'Dissoo', the Wolof word for 'dialogue'. The programme dealt with topics of economic, social and political importance. Over two-thirds of the programme content was recorded in the field. Groups sent in letters.

The broadcasting staff responsible for 'Dissoo' played an important part in supporting the groups. A large part of the small resources of the unit was concentrated on maintaining a liaison committee of nine different government departments. This committee not only planned an integrated programme schedule but was expected to answer and act on letters from the villagers. In the early days of 'Dissoo' the radio received a stream of letters containing violent complaints about government inaction. Many officials reacted against these and the programme would probably have closed down if President Senghor had not given it his strong support. (13) The villagers' letters prompted the broadcasting staff to take the role of agitators, making sure that farmers got the material and moral support that they demanded. For example in the early days, groundnut growers pointed out that it was no use advising them to use fertilizers if none were available; action was taken, groundnut harvests in the area immediately increased, and debts were repaid by farmers at an unprecedented rate of between 90 and 100 per cent. (14)

3 Tanzania: radio study group campaigns

Tanzania has seen a series of national radio learning campaigns. These, as we mentioned earlier, have attracted up to 2 million participants, who followed a radio series over three months. A group listened to a broadcast, then discussed it with the help of a printed text. A trained leader guided the discussion.

The three elements of radio, print and discussion were intended to be harnessed together. It was possible, however, to use two elements from the range and still learn from the campaign, so that even those who lacked books, radio or a group leader could join in. (15)

The results of these campaigns have been notable. The 1973 campaign on health produced many visible changes in health practices. Mosquito breeding grounds were destroyed, rubbish cleared from near houses, wells dug, water boiled or filtered, and hundreds of thousands of latrines dug. (16)

4 Acción Cultural Popular: radio schools in Colombia

There are many radio school systems in Latin America. One example, that of Radio Santa Maria, was quoted above. There, students learn mostly on their own. It is more common for radio school students to study in small groups. Typical are ACPO schools. Small groups, frequently family groups of mixed ages, study together. The group leader is generally a member of the group, but one who starts off with the advantage of basic literacy. These leaders are given support by parish priests and local ACPO fieldworkers - often the same person. These in turn are supported by regional fieldworkers. In addition ACPO regularly trains a number of young people in its colleges in techniques of community development. The aim is to have a large network of people trained to support local educational endeavours. (17)

A large number of studies have been made of ACPO's pioneering work. The most impressive result is that after over 30 years there are still many thousand ACPO groups in Colombia alone, and about 30 radio school systems in Latin America.

TWO-STAGE APPROACHES

The examples above are of what could be described as integrated distance-learning systems. The different elements are closely connected. We can, instead, take advantage of the strong motivational appeal of broadcast media and use them to provoke involvement in further learning.

1 'On the Move': the British adult literacy project

Short peak-time television programmes encouraged adults who were unable to read to seek help. Although a certain amount of instruction was contained in the programmes, the main effect was to arouse the motivation to learn. People could then buy primers at a bookstall, attend a class, or meet with a private tutor. The tutors were volunteers, and radio programmes and a manual contributed to their training. Between late 1975 and early 1978 about 125,000 people entered tuition, and about 75,000 volunteer tutors had been recruited and trained. (18)

2 Family planning in Lesotho

A long-term effort to increase awareness and use of family-planning methods is in progress. Distance-teaching techniques are being used together with conventional approaches.

Radio spots have been used to create interest, and a range of printed materials has been prepared, from simple short leaflets on different contraceptive methods to longer booklets and photo-stories. These are widely available, and act both as encouragement to seek help, and as a support to advice given by family-planning workers. An unusual contribution from distance education in this scheme is that the staff from the Lesotho Distance Teaching Centre have trained family-planning fieldworkers in giving talks and in producing their own teaching aids. (19)

In these examples the line between distance learning and conventional nonformal education has become blurred, while the possibilities for cross-fertilisation between the two begin to suggest endless patterns for nonformal learning.

INFORMAL INTEGRATION

The Malawi extension aids service

Magazines, radio programmes, booklets and films are all prepared locally and used to meet the needs of the moment. Old and new materials can be used together if appropriate. (20)

The organisation sounds simple, almost casual. In fact, such a level of integration requires foresight, planning and firm control. Recently the service has been developing techniques of action research, to ensure that its ventures continue to answer needs. (21)

PROBLEMS

We have looked at several examples of different systems, from tightly structured to loosely connected. We know that all of these patterns can be effective, but we know very little about what precisely makes one pattern more effective than another in different circumstances. Despite this, we have to make decisions. So let us look at some problems and some of the experience that may help us solve them.

1 The logistics of access

In designing a project we consider different media and assign functions to them. It may appear that potentially we have the financial and physical resources to carry out our plan. However if we go into action without careful investigation, we may find we cannot reach all our learners as we expected.

There may be inadequate distribution facilities. Printed

materials may be late in reaching their destination because of poor roads. Correspondence students may give up in despair because the postal service is too slow. Listening groups may disperse because reception is bad. Our plans have to be modified to fit with practical considerations. The Lesotho Distance Teaching Centre, for example, found that less than a third of households in the lowlands have radios, while in the highlands reception of Radio Lesotho is poor or impossible. (22) Their activities, therefore, make very limited use of radio at present, though this may change as more powerful transmitters are installed.

The learners may not have the material requirements for study. They may not have radio sets, or money to buy them. If they are loaned sets, can they pay for batteries? In work with radio for Botswana Extension College, the question of who paid for batteries was an important issue to resolve. The same college obtained from the government a franchise for free postage. (23) Some learners may not be able to afford stamps, or find anywhere to buy them when they need them.

There may be timing constraints. You may be allotted adequate time for broadcasts, but it may be at an inconvenient time of day. British Open University students, for example, have to burn the candle at both ends, listening to radio programmes in the evenings or very early in the mornings. Or you may find that time prevents you implementing your plans thoroughly. In the Satellite Instructional Television Experiment in India so much effort was put into organising the hardware for transmitting and receiving programmes that insufficient was left to prepare good programmes. (24)

Many such problems can emerge as a project gets under way. To help avoid them, forethought and research are needed, such as the survey of radio listening carried out in Lesotho. The learning system needs to be pared down and simplified, so that it makes both educational and practical sense. It is also a mistake to assume that a system that works well on a small scale will automatically work well on a large scale. A successful experiment with farm radio forums in the Poona district of India in the 1950s was followed by a large-scale extension of the project, which turned out to be disappointingly patchy in its effectiveness. (25) The structure of the system supporting the groups needed to be altered to cope with the larger numbers.

2 Keeping down costs

Since budgets are limited, we have a dilemma here. The more elements we add to our system, the more it costs. For example, the training of group leaders is expensive, even if they are not paid for their work. We do not as yet know enough about the effects of specific elements in a system to make clear judgments here. There is considerable evidence that much distance teaching achieves results comparable with conventional education at less or similar cost. (26) Sometimes the savings are dramatic. In the Canadian 'Tévec' project, for example, 12,000 students completed the equivalent of lower-secondary education as adults and passed a final examination. The cost was one-quarter that of the same course in

school for an equal number of students. A further 17,700 completed the course but did not take or did not pass the exam, while 52,500 watched the television programmes regularly. (27) If such peripheral students are counted as well, costs per student drop even lower. Sometimes, however, costs go soaring up. (28) Our problem is not one we can solve by assuming our programme will fit our budget. We need to cost each element of the system carefully before committing ourselves.

3 Continuity versus impact

Education ought not to stop and start. Adults should have the opportunity to continue to make progress in their studies. Non-formal education should ideally offer them a continuous integrated curriculum. This is difficult to achieve, both in the organisation of subject matter, and in structuring a system which holds the interest of the learner over a long period. Radio learning campaigns teach very effectively but are intended as short-term projects. Clubs or forums, in contrast, are long term but have a fluctuating impact. Interest flags after a while and groups become dormant, perhaps to be reawakened but perhaps to die in their sleep. The Latin American radio schools, however, do appear to have found a pattern which combines stability with enthusiasm. As well as offering a definite curriculum to their learners with a choice of entry points, some of them incorporate campaigns on particular topics in their teaching. Radio Santa Maria, for example, chooses a particular theme of social importance to concentrate on each week. (29)

The radio schools, however, have access to a great deal more radio time than most, with the advantage of flexibility and immediate impact that that brings. For most of us, the problem of sustaining interest over the long term is always present.

4 Supporting lone students

We know that students need support, and we know a number of ways of offering this. But we do not know the level of support that is needed. Most support systems for correspondence students are devised from hunch and humanity rather than hard research. There are also likely to be differences in the sort of support needed between individuals, social groups, age groups, cultural groups. To solve this problem in our own teaching, we need to observe and record the progress of different student groups, and devise methods for overcoming their difficulties.

5 Forming and sustaining groups

Occasionally learning groups form themselves. There are a handful of examples where distance learners have spontaneously organised *their own self-help* study groups. Such groups generally involve a very small proportion of all students in the scheme. The little

evidence there is suggests that people find self-help groups supportive to learning. But they tend to lack the stability that is needed for progressive learning. (30) It is therefore advisable to take steps to organise group learning.

One approach is to identify and approach existing social groups. For example, Mothers' Clubs in South Korea were singled out as widespread and stable groups, and have become not only centres where women learn about family planning and household matters, but also in some cases the focus for village development activities. (31) But it is seldom easy to identify such groups. Frequently we have to create them.

We can do this by finding people within a community who would be willing to gather and lead a group. These may be people who already have some experience related to the learning programme. In health education, for example, we could use traditional midwives. Often they are respected by the community and can be persuaded and trained to teach local women about topics such as family planning. However, there can be difficulties: a village midwife may refuse to accept that some of her traditional practices are dangerous; and while some midwives may be trusted by most people, others may have a bad reputation. It is certainly a good idea to seek local experts of this kind, but we must always examine carefully their practices and the meaning they attach to them, and discover their status in their communities. In some cases a local expert may be the ideal person to motivate and lead a local group; in other cases, he may be unsuitable, the project may be a failure, and we may lose the goodwill of the community.

Where local professionals are available, whether they are schoolteachers, agricultural extension workers, or community health officers, it is often better for them to give support to groups rather than act as leaders. They should be available for advice and practical help, openly expressing an interest in the group activities, but allowing the learners to work amongst themselves developing their ideas. They may of course have to take a more active role if the group leader is no good.

The main problem is that professionals tend, from habit, to be too authoritarian as leaders - and even as members. With the best will in the world, they find it very difficult to take a passive role, and not to intervene too frequently. One of a small group of project organisers who visited a group in discussion during the 1975 Tanzanian radio learning group campaign has described his own experience of this. This particular discussion was tape recorded. Though the project personnel were familiar with the democratic ideals of such discussion, and though they were present in this case as observers, on playing through the tape they found that they had spoken rather more frequently than all the regular group members. (32)

Group leaders can be self-selected, volunteering for the job, chosen by the project organisers, or chosen by the members of the community they are to work in. None of these approaches is entirely reliable. The last one may often be the best, although people may choose someone for the wrong reasons - because he has more schooling than most, on the assumption that this alone equips him for the job, or because he is favoured by village leaders. If

a large number of leaders are needed, we may have no choice but to recruit whoever we can find.

The difficulty of selection underlines the importance of training leaders. This has to be done effectively and quickly to keep down costs, particularly when we are working on a large scale. What sort of training is required? Part of it will be explaining to the leaders the commitment in time and effort that they must give to the project, but mostly it is a question of practical matters - the physical arrangement of the group, opening and closing meetings, filling in registers and looking after materials, including handling tape recorders or radios if these are being used. There will need to be some practice in techniques of leading and ordering discussion. This is all that is really necessary. (33) Beyond this, detailed instructions can be included in the teaching materials; and it is not necessary for group leaders to be more familiar than members with the subject matter.

Training needs can often be defined precisely. For the kind of training outlined above, an intensive course of two or three days will be sufficient. If this is impossible to organise and there seems to be no suitable alternative means of training, we should perhaps not bother with training at all. The Distance Teaching Centre in Lesotho found that groups where leaders had sketchy training did no better than groups where leaders had no training. (34) Whether leaders are trained or not, support while the groups are working will help, in the form of manuals or radio programmes for leaders, and occasional meetings with field staff.

The stability of a learning group depends a great deal on the quality of the leader. (35) This is one reason why long-term support is so important. We can also sustain enthusiasm by encouraging groups to send in news of their activities, and by reporting this over the radio or in newspapers; and groups should be visited regularly by field staff.

The main difficulty in all this is one of practical organisation. An extended programme of group study makes heavy demands on programme organisers. It is extremely difficult to provide sufficient support for large-scale projects. (36) This is a major reason why learning campaigns on the Tanzanian model can only be sustained for a few weeks.

Forming groups; finding and training leaders; keeping groups going: all of these require a great deal of effort. The results may be rewarding, but we should be prepared to find ourselves putting as much, or more, energy into this side of our work as into preparing the materials the groups will use.

THE CULTURAL IMPLICATIONS OF GROUP LEARNING

There are strong arguments on educational grounds for promoting group learning, and experience supports the arguments. Can we begin to see in what circumstances groups will work well, so that all members participate and benefit to their satisfaction? And can we see what steps we may need to take to make them work better?

A starting point is to look at a society's attitude to authority. Are we working in a highly authoritarian society, or is there a firm

tradition of democratic participation? Can we discover what the social structures are? To whom does one offer respect and by whom is one respected?

These are the sorts of questions that sociologists try to answer and if we are lucky we will find studies that will help us. If you are working within your own society you may have a general picture of how it works. You do not need a detailed analysis, but a general awareness of patterns of authority. In some societies, divisions are more strongly marked than in others; and societies are constantly changing.

We need to be aware of such divisions, since deference of members of one social group to members of another can inhibit discussion. Divisions can be of class, defined by birth, wealth or professional status. Members of a lower group may feel constrained always to agree with their superior in public, although amongst their peers they may admit to quite different opinions. Perhaps a group of farmers has in it one respected wealthy farmer. Group members may disagree with him, but be unable to express their feelings in his presence, so that the discussion is a failure.

The most prevalent example of this sort of inhibition is in group members' attitudes to the leader. Adults tend to have an underlying expectation that their learning should take place in an atmosphere similar to school. School teachers are figures of authority. Whether or not they act in an authoritarian fashion, it is generally thought by parents that they ought to, and our standard image of a teacher is a firm, directive person - even if we ourselves have never been to school or had such a teacher. The result of this is that learners tend to try to turn a group leader into 'teacher'. They expect to defer to him. This can be a very strong pressure. Just how strong is illustrated by experience in Sweden. This country has a long tradition of adult education. One of the techniques used is the study circle - groups of adults, informally constituted, studying a subject of their choice. A group can ask to study any subject it chooses, and a leader is provided. Study circles are very popular; about one in four adults in Sweden is studying in one at any particular time. You might hope that with this strong tradition of participation and control of their education, group members would be able to discard the 'teacher' image. However, study circle leaders have to fight continuously against the pressures put upon them to act in an authoritarian way. (37)

Another potential division is between the sexes. Women are frequently inhibited from expressing their ideas in the presence of men; it is seldom the other way round. In some societies the inhibitions can be very strong indeed. In India, for example, where villagers gathered together to watch the satellite television programmes, many women did not even attend the meetings because they felt embarrassed sitting in a crowded room together with men. (38)

Age can also be a barrier. Recently in Mali a number of village literacy centres have been established. Villagers could ask for a centre provided that they had found a local literate person willing to be trained as a monitor. In some cases the person that came forward was a young man, perhaps the only person in the village who had been to school. These young men were competent instructors,

but lacked authority among those older than themselves who would be their clients in literacy classes. (39)

We need also to become aware of the extent to which individual advancement is valued against co-operative advancement. In some places, the individual is expected to compete with others for the rewards offered by society. In others, such as many Latin American communities, people are intensely loyal to their families, valuing their welfare over personal advancement or over the good of the community as a whole. Or the spirit of co-operation can be dominant, with community or country valued above the individual.

Where there is a relatively strong tradition of co-operative activity, groups are likely to work well. In a highly individualistic society, it is more difficult. People will talk about their own experience amongst equals if their self-respect is not challenged. But as soon as a person of apparent authority is revealed, they may clam up. Paradoxically, people who value individual advancement highly are often more dependent than those from a co-operative tradition. They readily defer to authority. There is an assumption that those who are high up in society have arrived in that position through their own efforts and their individual superiority. Perceived differences are likely to create undercurrents of tension in groups of people from a competitive society.

It is likely to be difficult to discuss openly subjects where individual values conflict sharply with the needs of society. Education about family planning provides an example. It may be to the advantage of an individual or his family to have many children, for reasons of status or for economic advantage. On the other hand, it may be to the advantage of society as a whole that families become smaller. The benefits will ultimately affect the individual, but he has difficulty in perceiving this against his strong personal interests. In a group, people may change their attitudes through becoming conscious of other points of view. However, where values conflict, the group discussion is likely to be very lively and the group may even become fiercely divided.

We can draw some tentative conclusions. The best environment for group learning is where there is a tradition of co-operation. In societies with strong social divisions, we need to take particular care over the composition of groups. In more individualistic settings, group learning needs to be encouraged, to help people towards changing their attitudes, but group leaders need to be more skilled. Precisely what skills they require and how they can acquire them, is a subject of much debate.

THE CULTURAL IMPLICATIONS OF INDIVIDUAL LEARNING

We saw earlier that the isolation of the individual learner can prevent her from gaining confidence and can lead to her losing interest, and we suggested measures to support her. Can we see in what circumstances different measures are particularly important?

First, in societies where activities are usually co-operative, individual study can be bewildering. Some examples suggest that here we may find learners tending to form informal groups. The story goes that the farming course run by INADES was originally

intended for individuals; but when some villagers saw one of their number reading a book and discovered what it was about they insisted he shared his knowledge with them, and so the learning groups started. In Tanzania, officers of co-operatives are often trained by correspondence, but tend to study in groups even if each member is studying a different course. (40) The desire for some personal contact is very strong, and we should take whatever measures we can to provide it.

Individual study at a distance is particularly difficult in countries where there is no tradition of independent learning. In many poorer countries schools in the recent past have tended to be less imaginative, more authoritarian, more dependent on rote learning than those in the west. (41) Adults who have attended such schools are less likely to have the skills they need to study alone. They need a great deal of help with these, both with guidance provided as part of the materials they learn from, and with as much personal support by tutors as is possible.

In individualistic societies, lone study reinforces the tendency to private personal endeavour. This is no problem with some relatively neutral or technical subjects such as bookkeeping, but there is difficulty when shifts in values are required. Perhaps the only regular dialogue the learner has is a delayed one by correspondence with her tutor. For such subjects, broadcasts or tape-recordings which dramatise issues forcefully are extremely valuable in shocking the learner out of uncritical acceptance of her ideas. Occasional seminars or conversations with a tutor are also helpful.

The individual distant learner generally benefits from a great deal of support of all kinds. Until more research has been done to define which support strategies make most difference, and when, we should attempt to provide as comprehensive a support system as is possible.

SUMMARY

Looking back, we can see that it is likely to be relatively easy to prepare distance-learning materials well, compared with the problems in working out the way they are to be used. These are problems that are not fully resolved. We cannot describe a systematic approach to organising nonformal learning in the same way as we can describe how to prepare a text or a radio programme. But of course materials and the way they are used are closely related. Our perceptions of what is needed in print or on the air will change as we discover how the materials are used. We must realise, therefore, that we can never produce a finished product for use in distance learning. We may produce an extremely good correspondence text or a powerful television programme, and we may use it unaltered again and again; but we will quickly become aware of aspects that could be improved or bits that do not work at all. We must always be prepared to change, to start again, or to do things differently next time.

BACKGROUND READING

A general account of distance teaching which includes discussion of the issues in this chapter: Michael Young et al., 'Distance Teaching for the Third World'. About group learning in nonformal education: Godwin C. Chu et al. (eds), 'Communication for Group Transformation in Development'.

Conclusion

Our starting point lay at the crossroads between learning and culture. We wanted to see how to produce effective distance learning materials for the nonformal education of adults; and we wanted to explore the ways in which the culture of learners would affect the design of education. Such answers as we have found lie behind the guidelines of the last nine chapters. Inevitably they provoke further questions.

1 How do we define learning needs?
We have argued that learning should be based on adults' needs, and their own perception of those needs. But techniques for discovering and articulating them are still new, and subject to trial and error.

2 How do we combine media to best effect?
There is considerable knowledge about the effects of individual media, but less is known about the effects of each medium where several are used together. We must choose functions for each medium but we have to do so using little more than hunch to guide us.

3 How easy is it to learn in a second or third language?
Most research has concerned people learning a foreign rather than a second language. The language difficulties of a foreigner are likely to be quite different from those of a Colombian Indian learning in Spanish, a language widely used in his own country, or a Ghanaian learning in English. They may not know Spanish or English well, but have probably heard and used the languages all their lives.

Difficult questions then arise. Do people in these circumstances have a wide passive understanding of the second language, even if they cannot speak it well? Are they likely to be able to improve their knowledge of the language rapidly, because of their partial familiarity with it? What kind of difficulties are encountered by people learning in a second language? With fuller answers to questions of this kind, we would be better able to write for the millions who have to learn in a second language.

4 What kind of support for learners?
We know that distance learners need support. We know that discussion with other people helps adults to change their attitudes, and

that lone students are encouraged by some personal contact. We know that certain strategies have worked well in certain circumstances. But all this gives us little help in designing the right kind of support for each group of learners. In particular, any face-to-face element in distance learning is notoriously difficult to organise appropriately. So the evidence is patchy and we must often design support largely by rule of thumb.

5 How can we measure costs?

There are major problems in costing nonformal education, and research is needed to adapt the techniques used for costing formal education. It is particularly difficult to measure the effects of nonformal education, which are often difficult to isolate from the effects of other changes in people's lives. We may be able to discover how many dollars it takes to teach an adult to read. It is far more difficult to measure in money the effects of education in nutrition whose aim is a reduction in infant mortality; nor is it easy to compare such costs with those of alternative methods of reducing child deaths.

Much, then, remains to be learned. But experience so far has led us to our guidelines, sketchy though some of them must be. They are intended to be universal; in a sense materials can be planned and produced in the same way in any country. The choice between methods, and the choice of subject matter, depend upon the culture of our learners. But both sensitivity towards a culture, and mastery of the techniques of planning for effective education, are prerequisites for any educator. With these, there should be no great difficulty in designing material that will be understood, at least at face value. Some guidelines will help us to match learning to culture; others may show what further questions we need to answer about the culture of our students before we start teaching.

As we have repeatedly argued, teaching has to fit with learners' experience, making use of their existing skills and helping them to acquire new ones. Our approach must remain open-ended. We must identify major cultural values and use our knowledge of them and of their day-to-day application to identify the most usual patterns of thinking and learning. But inevitably there will be some guesswork, particularly in an unfamiliar culture. Even if we were to carry out detailed research on local attitudes to learning, success would not be certain. We are always necessarily limited to providing the best possible conditions for learning. We cannot force people to learn.

Notes

INTRODUCTION

1 Julius Nyerere, 'Development is for Man, by Man and of Man', p. 28.

CHAPTER 1 DISTANCE TEACHING

1 Henry Cassirer, Listening/Viewing Groups, p. 19
2 There are sharp regional differences in provision of primary school places. See Birget Fredrikson, 'Universal Primary Education in Developing Countries: a Statistical Review'.
3 Mark Blaug et al., Case Studies for Reforms.
4 Edgar Fauré et al., 'Learning to Be', p. 39.
5 Michael Young et al., 'Distance Teaching for the Third World', chapter 1. Some are more optimistic than this: see Peter Williams, 'Education in Developing Countries: the View from Mount Olympus'.
6 Michael Young et al., op. cit., chapters 2 and 3.
7 Hilary Perraton (ed.), 'Alternative Routes to Formal Education' (forthcoming).
8 See, for example, Tony Dodds et al., 'One Year's Work', p. 10.
9 Michael Young et al., op. cit., chapter 1
10 Tony Dodds, INADES - a Case Study.
11 Chandon-Moet, 'Les Groupes INADES-ASA dans le pays Bwa du Mali'.
12 John Ohliger, 'Listening Groups', pp. 6-15.
13 Ibid., pp. 15-38.
14 J. Nicol et al., 'Canada's Farm Radio Forums'.
15 E. Alex Sim, Canada Farm Radio Forum.
16 Wilbur Schramm, Radio Rural Forums in India, and W.F. Coleman et al., 'An African Experiment in Radio Forums for Rural Development, Ghana, 1964-5'.
17 For brief accounts of other forums and clubs and bibliographical data, see the directory in Michael Young et al., op. cit.
18 Budd Hall and Tony Dodds, 'Voices for Development' (on Tanzania); David Crowley and Ross Kidd, 'Radio Learning Group Campaigns in Botswana'.

19 Stephen F. Brumberg, Colombia: a Multi-media Rural Education Programme.
20 Emile McAnany, Radio Schools for Non-formal Education.
21 Robert A. White, 'Mass Communications and the Popular Promotion Strategy of Rural Development in Honduras'.
22 Wilbur Schramm (ed.), 'New Educational Media in Action', three volumes of case studies which give an idea of the extensive activity of the 1960s.
23 Henry Cassirer, 'Mass Media in an African Context' and, for greater detail, Pierre Fougeyrollas, 'Television and the Social Education of Women'.
24 While no substantial evaluation or account of the experiment has been published at the time of writing, Bella Mody, Planning Development-communication Software. Lessons from SITE, gives insight into the problems encountered.
25 For a case study of agricultural extension practice, see Robert Chambers, 'Managing Rural Development'.
26 Tony Dodds, 'Multi-media Approaches to Rural Education', p. 40.
27 Lesotho Distance Teaching Centre, 'A Service Agency for Distance Teaching'.
28 Ibid., pp. 2-3. The 'pitso' is a traditional village meeting.
29 Jill Merrick, African Development News Magazine Finds Eager Public.
30 Stephen Brumberg, op. cit., pp. 19-22.
31 An article on Kibaru is included in a dossier on the rural press in 'Direct', no. 2, pp. 15-38.

CHAPTER 2 HOW ADULTS LEARN

1 See, for example, cases quoted in D.M.G. Hyde, 'Piaget and Conceptual Development', pp. 182-201.
2 M. Geber, Problèmes posés par le développement du jeune enfant africain en fonction de son milieu social.
3 See summary of related research in Ministère de l'Education Nationale, Côte d'Ivoire, 'Programme d'éducation télévisuelle', vol. V, p. 20.
4 J.P. Ocitti, 'African Indigenous Education', pp. 58-61.
5 There are a number of books and essays by or about Jerome Bruner and Jean Piaget which develop these ideas further. Particularly useful are the article by Patricia Marks Greenfield and Jerome Bruner, Culture and Cognitive Growth, and Greenfield's discussion on Piaget, Recherche interculturelle et théorie de Piaget.
6 Michael Cole et al., 'The Cultural Context of Learning and Thinking', pp. 111-42.
7 See Hyde, op. cit., and Greenfield and Bruner, op. cit., for examples, and for a discussion of the issues, Michael Cole and Jerome S. Bruner, Cultural Differences and Inferences about Psychological Processes.
8 See examples quoted in Barbara Lloyd, 'Perception and Cognition: a Cross-cultural Perspective' and D.R. Price-Williams (ed.), 'Cross Cultural Studies: Selected Reading'.
9 Michael Cole et al., op. cit., p. 218.

10 Ibid., pp. 218-21.
11 I.M. Omari, 'Cross-cultural Studies on the Abilities of Children', p. 371.
12 Patricia Marks Greenfield and Jerome S. Bruner, op. cit., p. 654.
13 Paulo Freire, 'Education: The Practice of Freedom', describes the method.
14 Cynthia Brown, 'Literacy in 30 Hours', pp. 7-8 (the commentary on Figure 2.1 is closely based on Ms Brown's description).
15 Robert M. Gagné, 'The Conditions of Learning' (3rd edn), pp. 52-61. An account of other theories of learning appears on pp. 6-16 of the same book.
16 Robert M. Gagné, Learning Theory, Educational Media and Individualised Instruction, pp. 70-1. The six points are Gagné's, and the items below a summary of his text.
17 Ibid., p. 71.
18 Cynthia Brown, op. cit., p. 20.
19 Georg Elwert, 'Adult Literacy', p. 5.
20 For a summary of research on this topic, see Robert Gagné, 'Conditions of Learning', pp. 231-55.
21 Simone de Beauvoir, 'Old Age', chapters 1 and 4 especially. The author has made an extensive survey of research on the effects of ageing.
22 Ibid., p. 260.

CHAPTER 3 LANGUAGE, CULTURE AND LEARNING

1 Peter Trudgill, 'Sociolinguistics', p. 27 (Eskimos) and Manfred Wehrmann, Producing a Picture-card Vocabulary, p. 2 (Somalis). There are many other examples in the works of Claude Lévi-Strauss, e.g. 'The Savage Mind', chapter 1.
2 For a general discussion, see J.A. Fishman, The Sociology of Language, and for a study of the effects of failing to moderate language use in conventional fashion, see W. Labov, The Logic of Nonstandard English.
3 Angela Molnos, 'Cultural Source Materials', vol. 2, pp. 178-80.
4 Cynthia Brown, 'Literacy in 30 Hours', p. 22. The structure of words in Portuguese lends itself to learning to read by rearranging syllables. In many languages this will not work so well.
5 Titilayo Baiyelo, 'The Place of Culture in Science Education'.
6 Michael Young, 'Note on the Honduras Radio Schools'.
7 John Gay and Michael Cole, 'The New Mathematics in an Old Culture'.
8 The evidence is, however, rather patchy, given the importance of the question. Though there is strong support for 'mother-tongue' education, experience with bilingual education shows that disadvantages to children of learning in a second language can be minimal. See Unesco, 'Anthropology and Language Science', p. 37.
9 Personal communication from Dr John Long, Medical Research Council Applied Psychology Unit, Cambridge, England.
10 Abdul W. Khan, 'All India Radio's Non-formal Education Broadcasts for Rural Development'.

11 For a discussion of political considerations in language development, see J.A. Fishman, 'National Languages and Languages of Wider Communication in the Developing Nations'.
12 Gilbert Ansre, The Influence of English on West African Language, p. 145.
13 French must be used for formal discourse, while creole is always informal. For this, together with an analysis of different functions of languages in multilingual societies, see Eugene A. Nida and William L. Wonderly, Communication Roles of Languages.
14 Escuelas Radiofónicas de Bolivia/Acción Cultural Loyola, 'Educatión Radiofónica en Bolivia', pp. 19 and 27, offers one example. Nearly half the students in a survey in Bolivia preferred to learn to read and write in Spanish rather than their own language.
15 Unesco/UNDP, 'The Experimental World Literacy Programme', p. 168.
16 Unesco, 'Interactions between Linguistics and Mathematical Education', p. 44.

CHAPTER 4 THE CULTURAL CONTENT OF LEARNING

1 Panel discussion in Godwin C. Chu et al. (eds), 'Communication for Group Transformation in Development', pp. 353-4.
2 Carol Mallette Amaratunga, Ghana and Sri Lanka: Indigenous Non-formal Adult Learning.
3 W. Hudson, The Study of the Problem of Pictorial Perception, p. 149.
4 D. Lawrence Kincaid, with Wilbur Schramm, 'Fundamental Human Communication', pp. 43-6. For many similar examples, see Demetrio M. Maglalang, 'Agricultural Approach to Family Planning'.
5 Richard K. Manoff et al., 'Radio Nutrition Education'.
6 David Hargreaves, On the Move, pp. 78-9.
7 Lesotho Distance Teaching Centre, 'Testing a Family Planning Pamphlet', p. 12.
8 Kye-Woo Lee et al., The Korean Air Correspondence High School.

CHAPTER 5 PLANNING FOR DISTANCE TEACHING

1 The system is the one used by the National Extension College. Since the College was founded in 1963 it has been refined and adapted, and modified through the experience of the International Extension College and its sister colleges in Africa. The diagram is a modified version of Hilary Perraton's. The arrangement of boxes and headings within them are his, taken from Hilary Perraton, Two-way Communication Within a Distance Teaching System, p. 80. The rest of the wording is mine.
2 Emanuel De Kadt, 'Catholic Radicals in Brazil', pp. 251-4.
3 Roger Mitton, 'Research in a Distance-teaching Organisation', pp. 5-7.
4 Lesotho Distance Teaching Centre, 'The Use of Photostrips in Family Planning Education', p. 5. That group was used for

testing materials, but the technique is the one described here, and could easily have been used for defining needs.

5 An extension of this idea comes from the Botswana Extension College. An anthropologist who had completed fieldwork in the country a few years earlier was asked to return to the community she had studied and stay there for three months. She was to put together her existing knowledge and fresh observations and suggest priorities for nonformal education. See Kunnie Kooijman, 'Bokaa'.

6 Botswana, Lesotho and Swaziland Correspondence Committee, 'Report of Workshop on Organisation and Administration of Correspondence Colleges', p. 4.

7 Kamol Sudraprasert et al., 'Distinguishing Real from Imaginary Learner Needs'.

8 Margaret Mead, 'New Lives to Old', p. 3.

9 For an example of a well-designed curriculum for an exam course, see the appendix by Jack Roberts and Peter Hewitt to Hilary Perraton, 'The Techniques of Writing Correspondence Courses'.

CHAPTER 6 THE DIFFERENT MEDIA

1 J. Trenaman, 'Communication and Comprehension'. This contains a comparative study of the use of the three major distance-teaching media - print, radio and television - for adult education.

2 The evolution of theories of communication and diffusion of information is described in Everett Rogers and Floyd Shoemaker, 'Communication of Innovation', and in D. Lerner, Research in Group Communication: a Retrospective Note.

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5 Barbara Searle, Patrick Suppes and Jamesine Friend, The Nicaraguan Radio Mathematics Project.

6 Abdul Khan, information given as background to the presentation of his paper, 'All India Radio's Non-formal Education Broadcasts'.

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11 Tony Bates, unpublished report to Open University committee.

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16 J. Gunter and J. Theroux, Open Broadcast Radio: Three Formats for a Neglected Resource.

17 Susana Fernandez and Royal D. Colle, 'Communication at the Pila'.

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22 Nonformal Education Information Center, 'NFE Exchange', issue 12, 1978/2. The issue is devoted to nonformal education and entertainment and contains project highlights and an extensive bibliography.

23 K.N. Bame, Comic Plays in Ghana.

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25 Simoni Malya, Creating Literacy Surroundings in Tanzania, pp. 57-8.

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28 'Folkbildningsarbetet', pp. 17-19, discusses attitudes of group members to leaders in study circles in Sweden.

29 Robert White, 'An Alternative Pattern of Basic Education', p. 37.

30 Bernard Dumont, 'Functional Literacy in Mali', mentions the problem of finding volunteers to lead village literacy groups. School leavers were often too young to command respect in a society where one always defers to one's elders (p. 48).

31 Juan Braun, 'Communicación, educación no formal y desarrollo nacional', pp. 147-50.

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CHAPTER 7 WRITING SIMPLY

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8 Angela Molnos, 'Cultural Source Materials', volume 2, pp. 49-50.

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11 M.R. Emeneau, Oral Poets of South India - The Todas, p. 335.

12 Personal communication from an editor at the Lesotho Distance Teaching Centre.

13 E.S. Bowen, 'Return to Laughter', p. 105.

14 Michael Cole et al., 'The Cultural Context of Learning and Thinking', pp. 178-82.

15 Newcastle-upon-Tyne Polytechnic, Using Formulae for Assessing the Readability of Texts, comprehension package C3 of the Experimental Reading Course, p. 11. This is an excellent self-instructional manual, which can be completed at one sitting. A similar test, the Flesch Reading Ease Score, is equally easy to apply. It is described, with Cloze testing, in Rick Powell, Writing Readable Correspondence Courses - Feedback that Helps.

16 Ken Cripwell, What is a Cloze Test? How do I use It?, and Using Cloze Procedure for Assessing Readability, Comprehension Package C4 of Newcastle-upon-Tyne Polytechnic, op. cit.

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18 Lesotho Distance Teaching Centre, 'The Use of Photostrips'.

19 Ibid., p. 11.

20 Marian Halvorson, Instructional Materials for Literacy, p. 14.

21 A.H. Dyson, The Relationship between Word Frequency in Written and Spoken Hausa, points out that many words used frequently in 'easy' reading matter seldom occur in everyday conversation.

22 Julia Van Dyken, Towards Readable Writing.

23 Ibid., pp. 18-19.

24 Robert B. Kaplan, On the Notion of Contrastive Rhetoric, looks

at similar differences between English and several other languages.

25 Pamela M. Riley, 'The Cloze Procedure - a Selected Annotated Bibliography', provides a starting point for those wishing to investigate further.

26 Kay Williamson, The Rivers Readers Project In Nigeria, pp. 135-53.

27 H. Wallace Sinaiko, Verbal Factors in Human Engineering.

28 Colin Turnbull, 'The Lonely African', pp. 187-8.

CHAPTER 8 USING PICTURES

1 Bernard Shaw, 'Visual Symbols Survey', pp. 10-11.

2 Ibid., p. 12.

3 Study by Michel Souchon reported in Agence de Coopération Culturelle et Technique, La Perception de l'image, 'Direct', April 1975, pp. 24-5.

4 Bernard Shaw, op. cit., p. 23.

5 Ibid., pp. 23-4.

6 C. Bellahsène, 'Practical Guide to Functional Literacy', pp. 114-17.

7 Verbal report from observer.

8 E.V.G. Kwansa, et al., 'Perception and Comprehension of Health Education Visual Aids by Rural Ghanaian Villagers', p. 392.

9 Ibid., p. 392.

10 C. Bellahsène, op. cit., p. 120.

11 Ibid., p. 117.

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13 Jomo Kenyatta, 'Facing Mount Kenya', pp. 102-3.

14 Manfred Wehrmann, Producing a Picture-card Vocabulary, p. 4.

15 Lesotho Distance Teaching Centre, 'Understanding Print', pp. 13-14.

16 Agence de Coopération, 'Direct', op. cit., p. 25.

17 Bernard Shaw, op. cit., p. 6.

18 C. Bellahsène, op. cit., pp. 37-8 (cow) and Andreas Fuglesang, 'Applied Communication', p. 75.

19 Lesotho Distance Teaching Centre, op. cit., pp. 16-20.

20 E.V.G. Kwansa et al., op. cit., p. 392.

21 A.C. Holmes, 'Health Education in Developing Countries', pp. 66-7.

22 W. Hudson, The Study of the Problem of Pictorial Perception among Unacculturated Groups, p. 150.

23 Agence de coopération, 'L'alphabetisation à la découverte des média', p. 51.

24 Lesotho Distance Teaching Centre, op. cit., pp. 23-7.

25 E.V.G. Kwansa et al., op. cit., p. 392.

26 John Bowers et al., 'Action Research in the Production of Communication Media', p. 23.

27 Francis M. Dwyer, 'A Guide for Improving Visualised Instruction'; Paul L. Grover, Effect of Varied Stimulus Complexity and Duration.

28 Some examples are contained in Andreas Fuglesang, op. cit., pp. 90-3; E.V.G. Kwansa et al., op. cit.; Lesotho Distance Teach-

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29 Francis M. Dwyer, op. cit.

30 Wilbur Schramm, What the Research Says, pp. 47-8.

31 Verbal report by observer. A.C. Holmes, op. cit., also discusses this issue, p. 68.

32 Bonnie J. Cain and John P. Comings, 'The Participatory Process: Producing Photo-literature', is a helpful handbook.

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34 M.D. Vernon, 'The Psychology of Perception', pp. 112-13.

35 Patricia Wright, Presenting Technical Information, pp. 111-18.

36 John Bowers et al., op. cit., p. 11.

37 A.C. Holmes, op. cit., p. 66.

38 Lesotho Distance Teaching Centre, op. cit., pp. 21-2.

39 P. Burnhill and J. Hartley, Psychology and Textbook Design, pp. 67-8.

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41 C. Bellahsène, op. cit., p. 117.

42 Saulat Rahman, Visual Communication in India.

43 Ministère de l'Education Nationale, 'Programme d'éducation télévisuelle', vol. 8, pp. 6-13.

44 For a beautiful collection, see Fine Arts Collection Section, 'Peasant Paintings from Huhsien County'.

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46 World Education, 'Research on Innovative Nonformal Education for Rural Women', Phase I, Appendix D.

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CHAPTER 9 THE PRODUCTION OF PRINTED MATERIAL

1 H.W. Larken, Chairman of the Intermediate Technology Development Group Printing Panel, gave much assistance with this chapter.

2 Three articles summarise most of the information that follows: J. Hartley and P. Burnhill, 'Textbook Design: a Practical Guide'; Herbert Spencer, 'The Visible Word'; and Patricia Wright, Presenting Technical Information.

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4 Patricia Wright, Reading to Learn.

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6 Robert Waller, 'Numbering Systems in Text'.

7 Department of Typography and Graphic Communication, 'Post-publication Mini-research Project on "Your Move"'.

CHAPTER 10 MAKING RADIO PROGRAMMES

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2 J.A.B. Efionayi, The Uses of Mass-media in the Agricultural Extension Services of Nigeria; K.N. Bame, 'Comic Plays in Ghana'.
3 Reported in letter by Barbara Searle, 1978.
4 Agence de coopération culturelle et technique, 'La Radio rurale au Mali', p. 120.
5 Talk by Hernando Bernal of ACPO, 1977.
6 Secretariado de Comunicación Social, 'Efectos sociales de la educación radiofónica'.
7 Hilary Perraton (ed.), 'Broadcasting and Correspondence'.
8 Ibid., pp. 38-40: also see a letter from 'A Post Experience Student' in 'Teaching at a Distance', 10, p. 34.
9 Richard K. Manoff et al., 'Radio Nutrition Education'.
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16 J. Gunter and J. Theroux, Open Broadcast Radio, p. 349.
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20 Botswana Extension College Evaluation Unit, 'Report on the Radio Programme "Re Botseng"'.
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24 Robert White, op. cit., p. 32.
25 John Ball, Using Sound Effects in Schools Broadcasting, p. 208.
26 Ibid., pp. 208-14.
27 John Ball, School Radio: the Future, part 2, p. 105.
28 Robert Rowland, Some Thoughts on the Use of Broadcasting in the Open University, p. 63.
29 For further discussion and ideas on testing radio programmes, see John Bowers et al., 'Action Research in the Production of Communication Media', and James M. Theroux, 'Quality in Instructional Radio'.

CHAPTER 11 MAKING FILMS AND TELEVISION PROGRAMMES

1 James Potts and Tony Troughear, On the Road Again, p. 60.
2 Joseph Trenaman, 'Communication and Comprehension'.
3 M.D. Vernon, 'The Psychology of Perception', p. 106.
4 James Potts and Tony Troughear, op. cit., p. 60.
5 Romesh Chander and Kiran Karnik, 'Planning for Satellite Broadcasting', p. 31.
6 David Hargreaves, On the Move, p. 78.
7 James Potts and Tony Troughear, op. cit., p. 61.
8 Bert Cowlan, Thinking Small, p. 80.
9 Evelyne Pierre, 'Histoire d'un groupe de réception', p. 42.
10 Francis Oloukun Okediji and William Ogionwo, 'Experiment in Population and Attitude Change'.
11 Judy El-Bushra and Susan Perl, 'Family Planning Education in Action', pp. 39-40.
12 David Giltrow, 'Film Research and Field Testing', p. 56.
13 Romesh Chander and Kiran Karnik, op. cit., p. 30.
14 Ibid., p. 30.
15 J. Baggaley and S. Duck, Experiments in ETV, pp. 208-9.
16 James Potts and Tony Troughear, op. cit., p. 61.
17 Romesh Chander and Kiran Karnik, op. cit., p. 29.
18 Bert Cowlan, op. cit., p. 80. With Donald Duck it was primarily the subject that was offensive, but of course only a cartoon could show a duck imitating a person. Content and medium interact.
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23 Andreas Fuglesang (ed.), op. cit., p. 66.
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25 James Potts, 'Documentaries for Development'.
26 Joseph Trenaman, op. cit., p. 75.
27 Derek Rowntree, 'Two Styles of Communication and Their Implications for Learning', p. 283.
28 James Potts and Tony Troughear, op. cit., p. 60.
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33 Joseph Trenaman, op. cit., p. 163.
34 Ibid., p. 112.
35 Chapter 8, p. 80.
36 Joseph Trenaman, op. cit., pp. 47-8.
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38 John Bowers et al., 'Action Research', p. 21.
39 Arthur A. Lumsdaine, 'Content' and the Outcomes of Educational Programmes, p. 93.
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CHAPTER 12 APPROACHING NUMBER

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3 Quoted in Claudia Zavlasky, op. cit., p. 64.
4 Jomo Kenyatta, 'Facing Mount Kenya', pp. 102-3.
5 Claudia Zaslavsky, op. cit., p. 257.
6 John Gay and Michael Cole, 'The New Mathematics in an Old Culture', p. 43.
7 Claudia Zaslavsky, op. cit., p. 38.
8 John Gay and Michael Cole, op. cit., pp. 32-3.
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13 Roger Mitton, 'Research in a Distance-teaching Organisation', p. 4.
14 Richard R. Skemp, 'The Psychology of Learning Mathematics', pp. 133-5.
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CHAPTER 13 APPROACHING SCIENCE

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3 Ibid., pp. 169-72.
4 Titilayo Baiyelo, 'The Place of Culture in Science Education'.
5 Rufus Alabi, Training Teachers for School Science in Nigeria, pp. 107-8.
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7 John arap Siele and Gerry Hacker, 'Teaching Science at a Distance', pp. 3 and 34.
8 Ibid., p. 35.
9 Ibid., p. 12 - an example from Kenya.
10 Ibid., pp. 11-12 and 33-5.
11 Colin Cherry, Teaching or Learning? A Critique of Educational Technology.
12 Keith Warren, Primary Science Education with Local Resources in Asia, an article by the bicycle physicist mentioned above, packed with ideas.
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CHAPTER 14 HOW TO HELP LEARNING

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2 H. Marchant, Increasing the Effectiveness of Educational Films, pp. 92-3.
3 Lesotho Distance Teaching Centre, 'A Test on the Best Way to Present a Correspondence Lesson'.

CHAPTER 15 SUPPORTING LEARNING

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2 Agence de Coopération Culturelle et Technique, Les Systèmes multi-media utilisés pour l'éducation, p. 36.
3 Janet Jenkins and Hilary Perraton, 'The Invisible College', p. 60.
4 Personal communication from Robert LeFranc.
5 Lesotho Distance Teaching Centre, 'Learning from a Booklet', p. 63.
6 Judy El-Bushra and Susan Perl, 'Family Planning Education in Action', pp. 56-9.

7 See the annual Open University 'Courses Handbook'.
8 Naomi McIntosh, 'Women in Distance Education', p. 16.
9 Robert White, 'An Alternative Pattern of Basic Education', pp. 29 and 38.
10 Ibid., p. 55.
11 Tony Dodds, INADES - A Case Study, pp. 18 and 25.
12 Michael Young et al., 'Distance Teaching for the Third World', directory.
13 Henry Cassirer, 'Mass Media in an African Context', pp. 35-7.
14 Ibid., p. 50.
15 Budd Hall and Tony Dodds, 'Voices for Development', pp. 20-1.
16 Ibid., p. 39.
17 Stephen F. Brumberg, Colombia: a Multi-media Rural Education Programme, pp. 23-5.
18 H.A. Jones and A.H. Charnley, 'Adult Literacy', p. 100.
19 The Lesotho Distance Teaching Centre has issued a number of reports on its work with the Lesotho Family Planning Association. Among them are: 'Testing a Family Planning Pamphlet'; 'Attitudes Towards Family Planning'; 'The Use of Photostrips in Family Planning Education'.
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21 David Warr, Evaluating Media in Malawi.
22 Lesotho Distance Teaching Centre, 'Estimates of Reception and Listenership to Radio Lesotho'.
23 Personal communication, Hilary Perraton.
24 Bella Mody, Lessons from the Indian Satellite Experiment, pp. 117-21.
25 Wilbur Schramm, Radio Rural Forums in India, p. 134.
26 Michael Young et al., op. cit., especially chapter 4; Hilary Perraton (ed.), 'Alternative Routes to Formal Education', chapter 9.
27 Agence de Coopération, op. cit., p. 36.
28 Martin Carnoy, The Economic Costs and Returns in Educational Television, provides some examples.
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31 Judy El-Bushra and Susan Perl, op. cit., pp. 9-14.
32 Daniel Mbunda, Educational Mass Campaigns for Development, p. 202.
33 Ministry of Local Government and Lands, 'Lefatshe La Rona', pp. 151-72, and David Crowley et al., 'Radio Learning Group Manual', describe group leader training in detail.
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36 Budd Hall and Tony Dodds, op. cit., p. 49.
37 'Folkbildningsarbetet', pp. 14-19.
38 Anil Agarwal, Who Watches India's Schoolroom in the Sky?, p. 713.

39 Bernard Dumont, 'Functional Literacy in Mali', p. 48.
40 Sven Grabe, Tanzania: an Educational Program for Cooperatives, pp. 602-3.
41 C.E. Beeby, 'The Quality of Education in Developing Countries'.

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